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ABSTRACT

The first chapter of this report discusses the concept of individualization and identifies four general types: 1) individually diagnosed and prescribed instruction; 2) self-directed instruction; 3) personalized instruction programs; and 4) independent study programs. The U.S. Office of Education's PREP (Putting Research into Educational Practice) study of 46 schools is discussed in some detail in connection with pupil diagnosis; scheduled and unscheduled time; grading and report cards; student achievement; evaluation; and the reactions of teachers, students, parents; and school board members to individualization. The remainder of the document considers the following eight examples of approaches to individualization, which include all the major systems now available for implementation in schools: 1) Program for Learning in Accordance with Needs (PLAN); 2) Individually Prescribed Instruction (IPI); 3) Individually Guided Education (IGE); 4) Individualized Mathematics System (IMS); 5) Programmed Logic for Automated Teaching Operations (PLATO); 6) the Duluth plan for individualization; 7) Miami Springs "Personalized Learning;" and 8) Hawaii independent study program. Lists of participating schools are included for items 1, 2, and 4. (MBM)

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Individualization in Schools

The Challenge And the Options

OVERVIEW

Educators and philosophers have talked for many years about the unique nature of each human being and the need to attune the educational system to that uniqueness. Yet, like Mark Twain's remark about the weather, nobody has moved to do anything about it until very recent times.

Now many individualization programs, both large and small, some costing millions of dollars and some costing almost nothing, have made their way onto the nation's educational scene. The impact has been so great that education will never be the same again, regardless of what finally happens. The programs are generally described as individualized instruction. For proponents of the programs, individualized instruction means the right of every individual to acquire an education within the school system in his own way and at his own rate of learning.

It means adapting the school system to the individual, rather than the other way around. It means harnessing all the techniques of modern education, communication and technology to assist the individual toward self-development and self-fulfillment. In this light, individualized instruction is cast as "the wave of the future."

But, there are those who are asking questions. Some point out that the nature and demands of mass society in the twentieth century make it virtually impossible to try to tailor the huge educational establishment to the peculiar needs of the millions upon millions of children and adults who use it daily. Others contend that the amount of money required to change from the present system would be prohibitive.

What is the real story? What exactly is individualized instruction? Just where is it happening, and how? Is it working or not working? The purpose of this report is to examine these and other questions. Mainly, however, it directs itself to the here and now, and tries simply to tell, as plainly as possible, "This is what is going on...."

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WHAT IS INDIVIDUALIZATION?

Traditional teaching looks upon the class or group as an entity. Each child is presumed to have relatively equal learning needs, abilities and responses. It is teacher-paced and scheduled to meet the convenience of the school and the teacher. Students taught by traditional methods are generally given the same assignments, regardless of individual capabilities or progress. In those cases where individual assignments are made, they must usually be completed within a specified time period.

Individualization recognizes that there is no standard child, that each is an individual who learns in his own way and in his own time. The individualized instruction approach to learning seeks to motivate the child by helping him find his own areas of interest and by giving him individual assignments based upon those interests. Since individualized instruction is child-oriented, it requires a diagnosis of the child's development to determine the kinds of learning experiences he requires. After these needs are properly identified, instruction can be largely pupil-directed and pupil-administered and, within the limitations imposed by the school's broader time requirements, learning can be adjusted to the learner's needs and capabilities.

Some educators contend that individualization is not consistent with the needs of all schools and all children. While this is probably true, it is also true that the traditional classroom has failed many children and left teachers frustrated and defeated.

Individualization is not a magic cure for the ills of education. But schools which have adopted the technique generally agree they will never return to the traditional classroom. Individualization also scores high with most teachers. In a recent poll of teachers involved in demonstration schools for a project in individualization, more than 80% said they would prefer teaching at an individualized school in the future. But not every teacher who has been confronted with the challenges of individualized instruction has met with success and some have returned to traditional teaching styles. In most of these cases, however, there is reason to believe that these teachers lacked adequate training, materials and support.

Pupil response to individualized learning in general has been positive. Teachers report greater satisfaction, although they find they must work harder than in the traditional classroom. Schools which have made even a partial transition support the programs because they have usually resulted in improved pupil achievement, better attendance and virtual disappearance of many of the more common disciplinary problems. In a period when "doing your thing" has become the credo of the young, an approach that is in tune with that

philosophy tends to help students see more sense in the routine of going to school. This has given a boost to individualized instruction experiments.

The classroom that uses individualized instruction tends toward informality, is sometimes noisy and on occasion seems to even lack coherence. Because the children usually are more enthusiastic about learning when individualized instruction is introduced, parents usually respond in similar manner after the trial period. As schools moving toward individualization win community approval, school boards gain added support.

Individualization may be a partial answer to spiraling school costs. While traditional classrooms focus upon the teacher-pupil ratio, individualized instruction can make far greater use of the assistant teacher, the paraprofessional and instructional technology because children work individually within the group setting. At the same time, it has been found that regardless of the specific individualized approach, the teacher remains the key to the success or failure of the program. While the role of the teacher varies, depending upon the approach, the dimension he or she brings to the particular individualized system is both vital and necessary. Educators most deeply involved in individualization generally agree that talk of such programs "doing away with the teacher" is without merit. They have found this to be the case even with systems leaning heavily on the new technology.

There is no single standardized approach to individualized instruction. All approaches, however, have one element in common: the emphasis is upon the individual child rather than the group. In actual practice, the many forms of individualized instruction all use self-pacing by the child. Individualization does not rule out common learning objectives. As in the traditional setting, instruction seeks to teach the child to read, write, spell, calculate and otherwise perform prescribed learning tasks.

Four general types of individualized instruction, all oriented toward the individual child, have been identified:

1. In individually diagnosed and prescribed instruction, the school determines what and how the child will be taught. The school selects materials and determines learning objectives; the child is permitted to learn at his own pace.

2. In self-directed instruction, the child chooses the materials and determines how to proceed. The teacher and school administration determine learning objectives and goals. An example of self-directed instruction is in operation at the Mary Louise Aiken Elementary School, West Hartford, Conn., where the teacher determines the structure of the child's program and sets educational goals; pace and material are determined by the child.

3. In personalized instruction programs, the pupil sets his own learning goals. After these goals are chosen, however, the pupil is required to follow a program established by the teacher and to use specific materials selected by the school. As in other individualized instruction, the pupil determines his own pace, but the teacher is always available to provide help and guidance. An example of personalized instruction is in operation at Miami Springs (Fla.) High School, where pupils are given almost complete

freedom of choice of program, except for required English and math courses. After the pupil selects his program, he must make use of Learning Activity Packets (LAPs) to attain learning objectives. The learner determines his pace.

4. Independent study programs permit the learner to determine his own learning objectives and achievement methods. In most cases, only children of high learning capability are permitted to enter these programs.

Self-directed instruction, like independent study, is usually reserved for high learning capability children. Individually diagnosed and prescribed instruction is for children of all ability levels. Individually prescribed and self-directed instruction generally is associated with required subjects such as language arts and math. Independent and personalized instruction usually are associated with science, social sciences and elective subjects.

Current Developments

In a PREP (Putting Research into Educational Practice) study, the U.S. Office of Education reviewed current developments in individualized instruction. The study looked at 46 schools around the country and found four distinct trends which represented significant departures from traditional practice, although the framework was relatively unchanged in many cases.

In most of the schools observed, emphasis continued to focus upon traditional skills and subject matter, but the trend was toward becoming more specific, stating objectives in behavioral terms and extending the range of skills and subjects. About half the schools observed by the PREP study retain traditional objectives in skill and subject content while recognizing differences among learners. At Cashton (Wis.) Elementary School, for example, all pupils need not complete all elements of every subject. As a case in point, a slow pupil at Cashton may be permitted to skip Roman numerals if he has trouble with Arabic numerals. At Franklin Elementary School, Greeley, Colo., pupils are permitted to move through a prescribed curriculum at their own individual speed. The object is to permit each child to go as far and as fast as he can. The framework at Franklin is traditional; the objective is to move individuals rather than classes or groups.

At Melbourne (Fla.) High School, behavioral objectives have been written for the four basic disciplines--mathematics, English, science and social studies. Each department has prepared objectives in each phase of subject matter, in effect defining different levels of difficulty for each subject.

At Parkside Elementary School, Murray, Utah, the objective is to build the child's interests and to inspire enthusiasm for learning. To this end, the children are permitted to choose activities that interest them.

The E. L. Berger Middle School, West Fargo, N.D., stresses basic skills but permits the children to practice decision making by choosing alternatives and noting the results of their decisions. The ultimate goal is "to make middle school children (grades 5-8) problem solvers rather than storehouses of information."

About one-fourth of the schools studied by PREP reported major stress upon individual development, rather than on skills and traditional subject matter. In many such instances, schools do not teach "facts" in the conventional manner for handling subject matter.

At the John Murray Junior High School, Pendleton, Ore., the goal is to try to change the self-image of average or above average learners who are underachieving. The subject matter is used as an excuse to establish a relationship between pupil and teacher to determine the learner's needs. The school has concluded that the junior high school is not the time to stress formal learning because children are at a stage of readjustment. Academic growth is evaluated upon the basis of achievement tests; personality and emotional growth are measured through psychological testing and subjective teacher judgment. Physical growth is evaluated with the use of the Oregon Motor Fitness Test and the teachers' subjective judgments.

Twenty per cent of the schools studied by PREP stress the development of lifelong independent learning. The objective in these schools is the building of an attitude, atmosphere and approach that motivate the learner, rather than a sequenced, structured and predetermined series of learning experiences. The schools assume that the student will learn those things that appear relevant and that additional learning will take place with changing experience and requirements.

At Meadow Moore Elementary School, Granite School District, Utah, skill subjects are taught as a means rather than as an end. After basic skills are learned, the children are encouraged to pursue and develop their own interests. The school is divided into a primary and an upper area. The objective at the primary level is literacy. At the upper level efforts are made to make children "self-propelled learners, interested and excited in learning and able to develop the things in which they are interested."

A few of the schools that PREP studied gave great stress to relevancy. Teachers in these schools, as in traditional schools, emphasize specific subject matter content. Instruction differs from the traditional school in that the objective is to alter content so that it becomes relevant to the lives for which the students must prepare. The most massive and determined attempt to create relevancy was found in the Temple City, Calif., schools. Here, the school superintendent has sought to determine if the schools should be teaching children "to live in their world or ours." In seeking to create

Goal for Future: Stimulation of Lifetime Learning

"The school of the future should be dedicated to teaching students so they will...continue learning after they graduate and no longer have a school to assist them. If a student learns to assume the responsibility for his own education, then he will have made progress toward becoming an educated person."

--Annual Progress Report
Urbandale (Iowa) High School

relevance for the world the children will face, the Temple City schools have retained consultants and others who review the findings of "think tanks" to determine the type of knowledge the children will need to live successfully in the world of tomorrow. Parents and school board members have responded positively to this objective. The teachers, however, have questioned their ability to teach toward a world they cannot really know.

Pupil Diagnosis: A Key to Individualization

Diagnosis is the process of obtaining and analyzing data about the learner for purposes of appropriate individualized learning requirements. It means, in short, sizing up the pupil as to what he is interested in, what he can do and how fast he is able to do it; how best he can perform, whether in small groups, large groups or by himself; and how best he can be motivated toward prescribed goals. To be done properly, diagnosis is a difficult and time-consuming process, but it is as essential to individualized programs as snow is to skiing. Many of the schools in the USOE study leaned heavily upon diagnostic procedures; others were inclined toward subjective evaluation in the belief that existing knowledge and procedures are inadequate and in need of further testing and refinement.

In practice, there are three basic elements required for determining learning requirements:

- Special or subjective tests as the primary source data.
- Objective analysis and interpretation based upon test scores or a subjective evaluation of data which is used only as one consideration in making assignments.
- Diagnosis of learner requirements by individual teachers or by teams of teachers.

In practice, one overriding consideration--the interests of the individual pupil--enter into diagnosis and subsequent learning assignments. In some cases, this is the primary factor regardless of test results, interpretation of results or teacher diagnosis.

While the human factor was present in all cases in the PREP study, there is no absolutely rigid procedure in the nine patterns observed:

- Special tests objectively interpreted by one teacher.
- Special tests subjectively interpreted by one teacher.
- Standardized tests objectively interpreted by one teacher.
- Standardized tests subjectively interpreted by one teacher.
- Combination of tests and interpretative methods.
- Special tests subjectively interpreted by teacher team.

- Standardized tests subjectively interpreted by teacher team.
- Combination of tests interpreted by teacher team.
- Determination of assignments on the basis of pupil interest.

The special tests objectively interpreted by a single teacher was the most prevalent form of diagnosis found in the PREP study. The procedure used at Parkview Elementary School in Salt Lake City, Utah, is illustrative of this kind of diagnosis.

At Parkview, pupil achievement is determined by performance on prescribed tests and tasks. Following determination and interpretation of test scores, each child is placed in an appropriate level within a specific learning sequence. Materials are laid out so that the individual child may proceed at his own pace throughout the total course. There is emphasis on nongrading, and the child's teacher remains with him for three years, getting to know the child so well that there is no need for constant testing for further diagnosis.

Schools in which one teacher interprets a special test subjectively for assignment purposes are among the nation's most innovative in their use of individualized instruction. At the Southside School, Durham, N.C., the child's behavior is considered part of the test. Teachers are called upon to evaluate behavior and then work to reinforce responsible behavior in their pupils.

Standardized tests objectively interpreted by one teacher are employed at Cashton (Wis.) Elementary School where the Iowa Test of Basic Skills is the chief instrument used in diagnosing needs. Information supplied by the previous grade teacher and the results of the test are used in making initial assignments and in subsequent "contracts" made between teacher and pupil.

Granada Community School in Corte Madera, Calif., uses a wide range of commercial standardized tests which are made available to the children who are told to begin with any part they can finish successfully. Results are recorded only to determine where the child was successful and where he should begin. A Granada teacher observed that "children make appropriate choices 90% of the time." Goals are set on a subjective basis using test information for guidance.

Moore Elementary School, Granite School District, Utah, is an example of a school using combinations of tests and interpretive methods for diagnosis. Tests used may be teacher-made or commercial materials adapted to perceived needs. Moore's principal has explained that "the matching of the child and the teacher is more important than age level or anything else." So the school uses a special form to diagnose the child and to determine the kind of classroom in which he belongs.

Three schools in the PREP study use teams of teachers to interpret special tests subjectively. Differences in school populations have caused some differences in approach, but all rely heavily upon subjective team judgments. The G. S. Skiff School in Phoenix, Ariz., uses extensive standardized

tests with a school population which comes largely from Head Start programs. Standardized tests, teacher opinion and Head Start and other information are used by teaching teams to determine individual learning assignments. Wilson Elementary School, Janesville, Wis., on the other hand, uses teams for subjective judgments following pre-testing. The child is permitted to help set his own goals.

Duluth, Minn., schools are representative of those using both standardized and special tests interpreted by teaching teams. The Iowa Test of Basic Skills is used to obtain initial evaluations from which specific contracts, or assignments, are made. Materials provided to the children to carry out contracts include further testing materials to permit further diagnosis.

Huron (S.D.) High School and the independent study program at Kahala Elementary School in Honolulu, Hawaii, rely chiefly upon pupil interest for diagnosis. At Huron, course opportunities are fully explained and the individual student may enroll in up to 10 courses, depending upon his interest and ability to handle them. An extensive counseling service is built into the program to make certain that pupils move along an individually determined schedule. Kahala's program relies entirely upon pupil interest for diagnosis in determining the learning experience.

The picture that emerges on pupil diagnosis for programs of individualized instruction is mixed. It appears that no two schools or school systems use precisely the same methods and techniques. What works in one place may not work in another, depending upon whether the school is urban, suburban or rural; the type of student body; and the quality, training and interest of the teachers involved.

The PREP study does not attempt to answer the question, "Which diagnostic procedure is most effective?" Instead, the study suggests that "eventually, diagnostic procedures will be differentiated more by learner characteristics and less by other factors." Distinctly separate tests and diagnostic procedures will thus be used to size up students with high ability and motivation and those with low ability and few interests.

Where Learning Takes Place

Although stress in individualized instruction is upon self-pacing, learning activities in some situations are highly structured. In others, they are prescribed by teachers who are given a wide latitude on what project is assigned and how long it will take to complete.

Learning may take place in typical classrooms staffed by a single teacher, in single informal classroom settings with a single teacher or in a larger learning center where a single teacher or team-teaching techniques may be employed. Some programs also make extensive use of aides, assistant teachers or student teachers.

Twenty-four of the schools visited for purposes of the PREP study were found to rely on single learning areas and 22 on organized, large, multi-discipline learning areas.

Eight general methods for handling learning activities in a space and time framework were found among the 46 schools surveyed by PREP:

- Directed activities in multiple learning areas under a regular time schedule.
- Directed activities in multiple areas with time unscheduled.
- Directed activities in single learning areas with time scheduled.
- Directed activities in single learning areas with time unscheduled.
- Selected activities in multiple areas with time scheduled.
- Selected activities in multiple areas with time unscheduled.
- Selected activities in single areas with time scheduled.
- Selected activities in single areas with time unscheduled.

Where directed activities take place in a multiple learning area with time scheduled, the learning environment tends to be of high quality and the students receive significant guidance from the teacher and the materials. An example of this approach is East Elementary School in Tooele, Utah. The teachers make assignments on the basis of individual pupil performance. The children are organized into small groups, but each works at his own pace and task within a particular group. The groups are scheduled in their work so that maximum use can be made of available materials.

Use of Timing—Scheduled or Unscheduled?

Parkview Elementary School, Salt Lake City, is illustrative of the use of unscheduled time in a multiple learning area where activities are directed. The total course at the school is laid out for each child through materials organized around basic learning skills. Each child selects his own learning sequence and sets his own pace. The school is organized into pods of from 90 to 120 children, each of which has a team of three or four teachers. The children work individually in small groups or, on occasion, as a group of the whole. The school is nongraded. There are no fixed schedules. Children and teachers stay together as a unit in the same pod for three years.

The PREP study found that directed activities in a single learning area with time scheduled was the most common arrangement found among secondary schools using individualized instruction. Hillsdale High School, San Mateo, Calif., made use of this procedure in its individualized remedial reading and mathematics programs. The school operates with 56-minute class periods on a regular six-period, five-day week. Under a computer programming system, each of 40 students, with different study programs, is scheduled to individual learning carrels each period. Skokie Junior High School, Winnetka, Ill., uses "goal cards" to direct learning activities. Haxtun (Colo.) High School has students taking traditional courses, but then employs individual contracts within each course for each student.

Few schools use a pattern where activities are directed within a single learning area with time unscheduled. Students at J. E. Gibson High School, McComb, Miss., which makes use of this pattern, has its students enroll in one course for a nine-week period. Each course runs from four to six hours. Within that block of time, students schedule their work as they see fit, performing in a traditional classroom setting. Miami Springs (Fla.) High School uses a variation of the same pattern, permitting students to select classes on a free-choice basis, much as is done in college. Students have the option of morning or afternoon classes, or they may take some courses at night.

Efficient use of limited resources results from the use of time-scheduled, selected activities in multiple learning areas. Duluth, Minn., public schools permit students to map a daily learning plan which is checked and monitored by the teacher. The student follows the time schedule he has developed and works with a variety of materials in a large multiple learning area.

The PREP study found that maximum pupil freedom is achieved in multiple learning areas where pupils largely determine their own materials and the time they devote to their subjects.

John Murray Junior High School, Pendleton, Ore., makes use of a unique application of this approach. It has created a learning atmosphere in which underachievers have reportedly blossomed. An initial attempt at individualization at the school was limited to underachievers, but it was found that a mix of students at all levels of achievement was required to make it work well. The goal has been to bolster student confidence. The school has a fixed subject matter content and no attempt is made to evaluate achievement. Children may use their time as they see fit. The teacher's main responsibility is to provide materials and maintain the necessary separate learning areas. As a result, a number of underachievers were able to reach "normal" grade levels within a year.

Grand View (Idaho) High School typifies the arrangement in which time is scheduled in a single learning area, but where students have a significant part in the selection of their learning activities. Students are assigned to regular classrooms according to predetermined hourly schedules. There is, however, a learning resources center which is always available to students for completion of individual projects. Teachers familiar with resources in their subject areas alert students to available materials. The student moves ahead at his own pace.

What About Grading and Report Cards?

All children achieve at some level in all subjects, and the traditional report card has long been the accepted recorder of the degree of success or failure. Although subjective factors generally enter into grading, parents usually approve the report card because it is easily understood and because it appears to be an objective measure of how their child is performing in school. In measuring performance, the traditional report card assumes that all students should be at similar achievement levels in a given class. The device was developed to meet the needs of teachers confronted with the demands of the traditional classroom setting.

Individualized instruction poses new problems in measuring student progress because it assumes that each child learns different subjects at a different pace, and that some subjects may come easy to a child and some present degrees of difficulty. Attempts to measure progress have led to modification of traditional reporting and to new approaches that emphasize effort and individual progress, rather than grades.

While most schools studied in the PREP report continue to use the traditional report card, grades tend to symbolize levels of effort rather than standardized test results or class standing. For example, Roy (Utah) High School uses traditional report forms to indicate progress in specific subjects. The teacher and student, however, jointly determine individual course content and evaluation is based upon a combination of traditional and nontraditional criteria: "A" for significant academic achievement, "B" for work near capacity level, "C" for average work effort, "D" for work below average, "F" for students who can achieve but refuse to make a significant effort. More than 43% of the schools in the PREP study use the letter or number grades found in traditional report cards.

Learning packets designed by teachers outline work expected of students during a semester in order to win an "A" or "B" at Patrick Henry High School, San Diego. Those who complete a course but fall below the two top grades get "Cr" or credit. Replacing the traditional "F" is an "NC," or no credit. If a student gets a no credit rating, he must repeat the course. Each course packet lists an objective on which the students are tested--whenever they decide they are ready.

Some schools make a conscious effort to deemphasize grading. The principal at Urbandale (Iowa) High School explains why: "We feel that learning should be stressed over grades in education. Grades in the usual sense have been socially and emotionally damaging to children. Grades often reward the bright (maybe creating a false sense of values) and reject the below-average student. In order to promote the ideal of learning, our school does not maintain an academic honor roll, offers some pass-fail courses, conducts educational activities which are not graded (option days, quest days, seminars, etc.) and encourages students and teachers to openly debate the value of learning over grades."

Other schools continue to use the traditional report card but supplement it with parent-teacher conferences or parent-teacher-pupil conferences. Winnetka (Ill.) Public Schools exemplify this approach. The schools use a "goal record card" which is both a report card and a guide. A school official explained that the "child is helped in his evaluation of his own growth by carefully kept goal cards. The teacher is able to evaluate segments and even the totality of what has gone on in the classroom. Parents in their conferences with teachers can gain an appreciation of their child in his many dimensions, of his teacher in her many roles and of the school system in its flexible but orderly educational program." Matzke Elementary School, Cypress, Tex., underscores the parent-teacher dialogue, but the principal points out that "we also have a report card. The only difference is that the child's level is identified. For example, when he is graded in reading, the parents are told what level he is reading on and he receives an 'A' for excellent progress, 'B' for good progress or 'C' for acceptable progress."

PREP found that nearly 30% of the schools used a combination of report cards and scheduled parent-teacher conferences for keeping track of student progress for parents. A number of schools have abandoned the report card altogether and rely on conferences with teachers. At East Elementary School, Tooele, Utah, for example, there are no grades and all reporting is handled in a parent-teacher conference which is called "when needed." A minimum of three such conferences are held during the year, and some children have more. The child, on occasion, is also brought into the conference. At Shaw View School in Phoenix, Ariz., parent-teacher conferences are held on a group basis so "parents will meet the entire teaching team that is dealing with the individual students."

The PREP study found a new report form at some schools. At Parkside Elementary School, Murray, Utah, teachers make up report forms in various subject areas to show parents where their children are in the program. In reading, for example, "we list all the books in the Ginn series and all the reading skills that are covered. Then we indicate what skills Johnny has accomplished. We do the same thing in our social studies program. We also show what we are trying to individualize and what areas are nongraded."

Granada Community School, Corte Madera, Calif., makes use of a detailed form called a "pupil personnel inventory" as part of parent-teacher conferences. It provides a descriptive picture of what the student is doing at school. Cashton (Wis.) Elementary School has developed contracts for all basic subjects. Teachers rate students additionally for (1) knowing the basic facts, (2) doing accurate work, (3) working well alone and (4) cooperating with others. Cashton officials found they had to give letter grades because of parent expectations, but these were derived from the contract and other data. Barnsley Elementary School, Rockville, Md., has developed a checklist of skills which are graded on a pass-fail basis. The phrase "needs encouragement" is added when the teacher deems necessary.

PREP uncovered no single formula for rating or grading that could work for all schools. It found that some schools, for lack of such a tested measuring tool, are sticking with traditional grading on standard report cards. More of an effort is being made, however, to "individualize the grade" to each student, his abilities and performance.

Do Pupils Learn More?

While there is little objective evidence concerning the impact of individualization on learning, there are strong indications that the results are highly positive. About half of the 46 schools with individualized instruction programs studied by PREP had no formal evidence of success or failure in learning achievement, nor had they developed plans to obtain such evidence. Seventeen schools had test results which, in most cases, showed academic success. Many others used questionnaires, attendance rates, dropout rates and data on disciplinary problems in reviewing results. Four had extensive plans evaluating their programs by objective standards.

In measuring the impact of individualized instruction programs upon learning achievement, many schools look into the subjective reactions of

teachers, students, parents and school boards. The general picture drawn by the opinions expressed, together with other nontest data, is seen as significant in determining the impact of individualization upon learning attitudes and results.

Parkside Elementary School, Murray, Utah, has sought to document learning achievements of individual children. The schools report gains of from two to four years within a single school year, based upon standardized test results. The data, however, has not been treated statistically, and there is no firm proof of such achievement

On the contrary, Duluth (Minn.) Public Schools, using the Iowa Test of Basic Skills, has found no greater gains from individualized instruction than in its traditional classrooms. The city's school superintendent has explained that while test results show a "standoff," the schools' "overall objective in the whole program is attitude change, and we don't have the kinds of instruments for an evaluation of that objective."

Wilson Elementary School, Janesville, Wis., administered standardized tests seven months apart. It reported "the results showed that all of the different levels grew a year in comprehension." In spelling, the pattern averaged 1.2 years for one 7-month period.

While objective performance of individualized instruction programs has generally been lacking, four schools have developed elaborate plans for making an evaluation--Granada Community School in Corte Madera, Calif.; the G. S. Skiff Elementary School in Phoenix; Nova Public Schools in Fort Lauderdale, Fla.; and Southside Elementary School in Durham, N.C. Granada School's plan for the first phase calls for using the STEP test in achievement (reading, mathematics and social studies); measurement of critical thinking skills using tools developed by the school for the second phase; and student response to questionnaires for the third phase.

The Skiff School, with outside consultants, is designing an evaluative program aimed at "instructional objectives" of the school. The study would examine the organization, content, method, facilities and costs at the school during the first phase. The second phase would look at the students, teachers, administrators, specialists, families and the community. The third part, on "behavioral outcomes," would probe knowledge, skills, attitudes and beliefs of the students.

The other schools, Nova and Southside, have long-term evaluation programs under way to assess the impact of individualized instruction. These are also being handled in phases.

Reaction to Individualized Systems—'Mostly Favorable'

Teachers, students, parents and school board members generally have shown a favorable reaction to programs of individualized instruction. Teachers report that while the program involves more work than is required in the traditional classroom, they obtain far greater satisfaction from the job and find it more stimulating.

Some, however, are uncomfortable in settings where each pupil works at his own pace on individual assignments. Such teachers usually request a transfer back to traditional classrooms and are rarely found in established individualized instruction programs. A few teachers in the PREP study had achieved success in individualized classrooms, but wanted to remain in the traditional setting because it was less demanding. Generally, the critical period for teachers lies within the first six weeks, the period of greatest pupil adjustment.

Teachers at Southwest High School, Green Bay, Wis., felt the new program had been "railroaded" on them and would have been rejected if put to a vote by the entire staff. After a year had passed, however, one school spokesman observed that "about 90% of the teachers now favor it. Ten per cent are still dragging their feet and the major reason is that they are content-oriented rather than concept-oriented."

A teacher at Roy (Utah) High School commented: "I taught in a traditional system and it just doesn't seem like I'm accomplishing what I did in the traditional system because I can't show results on paper--how much we've covered and all that. But then I remember all those spontaneous learning experiences that I think are more valuable than having the neat rows, the lectures, the study hour. There's spontaneity to this program; the kids seem to be learning how to learn, the joy of learning."

The PREP study found that teachers who had never been involved in individualized instruction were the most critical of it. Student reaction was almost universally favorable. While perhaps as many as 5% may have taken advantage of the greater freedom offered, the overwhelming majority soon became absorbed in their individual tasks and found them stimulating and enjoyable.

A number of schools have conducted pupil surveys. Such a survey among fifth-grade children at Brittan Acres Elementary School, San Carlos, Calif., showed 43 very positive and one negative reaction to the school's individualization program. The negative child reacted unfavorably because he liked to have his own desk and storage space. At his mother's request, the child was transferred to a traditional school.

In another survey of student reaction to an individualized reading program at Hillsdale High School, San Mateo, Calif., the students were unanimous in their support of the program.

Initial parent reaction tends to be skeptical. But this attitude quickly fades after children begin to reflect enthusiasm for the program. Skepticism and outright hostility, however, may remain in the case of problem children who fail to benefit academically or through attitudinal change. Parents of such children often blame the innovation as the reason for the failure of their children.

The reaction of school board members tends to parallel that of parents. One superintendent summed up his board's view in these words: "If you have parent support, you have board support." The principal at the Brittan Acres School, who sought and obtained significant parental involvement in the school's program, explained that "it is really just a matter of educating

the parents--letting them find out about the teacher context we use and letting them compare this context to the one which has the teacher standing in front, talking to everyone."

PREP found that individualized instruction tends to reduce disciplinary problems in the schools. School authorities in general had kind words for the resulting improvement. According to the superintendent of schools in Milton, Pa.: "During the three-year period we have been in this new program, we have had about three or four students sent to the office for discipline. The traditional experience was that we would get about 10 students per week."

School officials also believe individualized instruction improves pupil adjustment. The principal at Wilson Elementary School, Janesville, Wis., explains: "You definitely see a trend in terms of a child's behavior, because the child is much more self-directive and self-selective. He sets up his own rules and goals realistically, in terms of what he can do...."

Similarly, schools visited by the PREP researchers reported that truants and dropouts declined significantly following the introduction of individualized instructional programs. This has proved to be a major selling point for those desiring to bring an innovative program of individualization into a community.

There Are Problems, Too

While lack of adequate money remains a gnawing problem confronting the nation's schools, few of the schools examined in the PREP study saw financing as a major obstacle to individualization. The absence of a financial problem perhaps stems partly from the exciting, innovative nature of individualization and a consequent willingness on the part of school authorities to come up with the funds needed.

Programs of individualization also come with all sorts of price tags, ranging from practically nothing to millions of dollars. Without federal, foundation or other support, few school systems are likely to look beyond the less expensive plans. Instead, they will probably depend on the energy and imagination of administrators and teachers to build the individualization program into something worthwhile.

Nearly 37% of the schools in the PREP study, a total of 17, reported no significant problems. While school officials and teachers at these schools may have been prone to exaggeration, simply to earn an extra plaudit for their program, the observation by PREP researchers bore out the claims.

The primary concern of school officials was with teachers who, in some cases, caused severe problems. Often teachers believed, with apparent justification, that demands made upon them were unreasonable, that they were not consulted on the program ahead of time, or that they were not given sufficient training and support.

A Salt Lake City principal complained that "if you get a conflict between the principal and any one teacher (on a teaching team), you are going

to have problems. If that is multiplied by two or three teachers, it is harder to operate because the program needs cooperation. It is quite obvious that all teachers should not be in team teaching schools...."

The superintendent in Duluth, Minn., said the "biggest problem with teachers is their inability to relate to individuals." He explained: "The average teacher in the average self-contained classroom teaches a class, a personality of 30, which in a sense has a kind of entity of its own. She treats more the personality of the class than she treats the personality of the individual. I think this is true of 98% of the classrooms in this country. Now, with individualized instruction, there is no longer a class personality. The teacher has to develop a new kind of relationship with the individual students."

An Evanston, Ill., principal reported "great difficulty" in finding the right teachers for a team. A Pendleton, Ore., principal observed that some teachers feel threatened with an innovation like individualization. Commented an Omaha, Neb., principal: "A major problem for teachers was that they didn't realize until they got into the program what a prodigious and tremendous task it was to build your own materials. They found it to be an exhausting job. On the other hand, most of the teachers felt the development of new materials was one of the most enriching experiences they had ever had. It is great for the teacher if he can survive."

While parents generally accept individualized instruction as a positive innovation, there are parent problems resulting from apathy and resentment. In more affluent areas, the most common parental complaint is that schools do not test the mettle of children sufficiently and that the children fail to meet parental expectations.

While students do not usually constitute a major problem, some encounter difficulty in making the transition from the traditional teacher-directed instruction to the self-directed instruction, even when given teacher support. For many students, discipline becomes a problem at the start of the program. One principal in Salt Lake City estimated that it takes three years "before individualized instruction really hits."

A Huron, S.D., principal noted an inability on the part of students to use time wisely. He said his students get "themselves in trouble because they are wandering around...."

Many traditionally oriented students are unable to meet the demands of a self-directed program. The director of the Nova Schools, Fort Lauderdale, Fla., underscored this point: "Not every student can operate in this kind of school. I would recommend that any district that has only one small school not change the whole district at one time, but take a segment of a school and individualize it, and gradually move towards an individualized program. A place should always be left for those kids who need to be seated, constantly watched and constantly told what to do."

A few schools in the PREP study reported problems with board members who were apathetic or who balked at innovation. Other schools faced problems because communication between project staff and school officials broke down.

The need for different kinds of materials and the lack of appropriate materials ranked high for many schools involved in individualized instruction programs.

One Midwest principal, anguished at delays in the program, asserted he would rather pay teachers to develop materials during the summer months than purchase commercial materials. Many teachers also point out that the kinds of materials needed--books, pamphlets, filmstrips, overlays, records, projectors--are costly and sometimes unavailable.

The principal of a high school in Haxtun, Colo., said "one of our biggest problems is to try to find individualized materials. If they are available we certainly have not been made aware of them. There is a definite need on the part of some group to develop more materials that can be utilized for individual instruction." PREP noted that materials for individualized instruction programs have been slow coming on the market, but that the situation is now changing.

Measuring Success or Failure

Studies of individualized instruction show that considerable effort has been used to develop effective procedures and program objectives. There is also significant indication of concern with the improvement of diagnostic techniques.

Far less attention has been given to program evaluation and, in many cases, the relationship between stated objectives and evaluative procedures is tenuous at best. The PREP study says there is little concern with the evaluation of long-term goals to determine whether procedural modification is required for their achievement.

Management of Learning: A New Role for Teachers

"For more than 40 years theoreticians and researchers have written about how children differ in their way of learning and rate of growth and development. Most teachers today, having been educated during this period of time, have read the statements and generally agree with them. During much of this same period, publishers have developed educational materials to help teachers individualize instruction. Once the federal government made educational funds available, schools purchased large quantities of machines, books and materials for the teachers to use. It seems, then, that teachers should be able to organize the classroom for meeting individual needs. Yet, most consultants or supervisors who regularly visit classrooms see that the majority of teachers do not do so. If this is true because they do not know how, it becomes the task of the supervisor to assist teachers to put the theory and research results into practice."

--Daniel J. Converse
Former Delaware State Supervisor of Reading

A Critical View of 'Individualization'

Opinions differ sharply on the benefits provided for children by individualized systems of learning. Many educators are enthusiastic about its potential, while others are questioning or openly critical.

Charles E. Silberman, a member of the board of editors at Fortune, pinpoints the fears of many critics in his highly publicized book, Crisis in the Classroom. Silberman points out that the use of specific behavioral objectives, a fundamental part of most individualization systems, tends to measure "the things that can be measured." He says "this tendency is clearly visible in the Individually Prescribed Instruction (IPI) approach," which he cites as an example of what he thinks is wrong with all systems that provide predetermined answers and do not permit the learner to do his own prescribing.

In IPI, Silberman says, "individualization is defined as permitting students to cover the prescribed curriculum at their own rate of speed--a useful but narrow and restricted view of individualization and of individuals." Silberman complains that IPI's version of individualization "does not permit the individual student to define his own goals and attempt to reach them; it permits him only to reach someone else's goals at his own rate of speed."

What is crucial to Individually Prescribed Instruction, Silberman says, "is not the adjective 'individually,' but the verb 'prescribed'; and what the individual does must be prescribed in terms so narrow as to leave no room whatsoever for the exercise of individuality. The system simply cannot accommodate a student who wants to strike out on his own." The result of IPI, Silberman charges, is that it achieves the "ultimate irony"--it "forces students into a passive, almost docile, role under the name of individualization. Because the material is presented in programmed instruction form, the student not only cannot specify his own goals, he cannot reach them in his own way; he is limited to the program, with its preordained answers. He cannot 'internalize' or apply what he has learned, for he cannot reconstruct the material in his own way.... The rigidity of the structure implies that there is only one right answer and only one route to it; but what students (and teachers) may need to learn most is that some questions have more than one answer--and that others may have no answer at all.

"The problem runs still deeper," Silberman continues. "One can argue, after all, that the rigidities and biases of IPI are due not to the concept but to the current limited 'state of the art' of programming, and that further refinement of programming techniques may eliminate the objections we have raised. The argument," he says, "will not stand: the weaknesses of IPI, and of computer-assisted instruction, is inherent in the behaviorist approach to education itself, with its insistence that the goals of education not only can but should be defined in precise behavioral terms. This insistence on behavioral definition of objectives...is a prescription for training and not for education. In both education and training, goals are, or should be, specified; the difference lies in how the goals are related to the process of instruction itself. In training, the behavior to be produced is embedded in the lesson itself.... In education, the student's achievement is defined by what he does--and what he is--after the lessons have all ended." (Permission to reprint excerpts from Crisis in the Classroom granted by Random House, Inc.)

INDIVIDUALIZATION SYSTEMS

Individualization in the nation's schools has taken many directions. Elaborate systems have been developed to achieve individualization of learning, detailed step by detailed step, for all levels of the elementary school.

And, to a much lesser degree, systems have been developed for the four years of high school. Other efforts have been far less sophisticated in program operation. Some permit much leeway to the teacher and others provide most of the answers for the teacher as he seeks to fit a learning program to the needs of an individual student. Some differ in only small details and others differ widely in their search for individualizing learning.

The following are eight examples of approaches to individualization, including all the major systems now available for implementation in schools:

Program for Learning in Accordance with Needs (Project PLAN)--p. 20

Individually Prescribed Instruction (IPI)--p. 27

Individually Guided Education (IGE)--p. 39

Individualized Mathematics System (IMS)--p. 43

Programmed Logic for Automated Teaching Operations (PLATO)--p. 51

The Duluth Plan for Individualization--p. 54

Miami Springs: 'Personalized Learning'--p. 60

Hawaii: Independent Study Program--p. 63

PROGRAM FOR LEARNING IN ACCORDANCE WITH NEEDS (PLAN)

Project PLAN (Program for Learning in Accordance with Needs), a joint effort of private research, private industry and public schools, represents one of the nation's major efforts to individualize instruction. One of the most extensive individualized learning efforts to date, Project PLAN operates in grades 1-12 in language arts, mathematics, science and social studies. It is an ungraded, learner-oriented, computer-supported program where objectives, content, rate and instructional materials are tailored to the individual student. The system utilizes currently available instructional materials and offers instructional procedures, student performance assessment, instructor training, system trouble shooting, statistical analysis for materials and tests revision, and computer support and management facilities.

The program was developed jointly by the American Institutes for Research (AIR), a nonprofit behavioral science organization, and Westinghouse Learning Corp. (WLC). Initial funding for the project was supplied by WLC under an agreement whereby it was granted exclusive rights to all materials and programs developed during the experimental stage. There are substantial differences between PLAN and Individually Prescribed Instruction (IPI), a Westinghouse spokesman said. IPI, a federally sponsored program, is developing much of its own curriculum. PLAN is utilizing available commercial materials, adjusting them to the individualized program. PLAN depends on computers and IPI does not. Both IPI and PLAN let the student work at his own pace, but PLAN officials say their program offers more varied options for both pupil and teacher. Pupils in both programs may learn through independent study, small group discussions, large group activities or teacher-led activities.

Project PLAN was begun in 1966 when instructional programs were designed for levels 1, 5 and 9 by teachers from 12 cooperating school districts in California, New York, Pennsylvania, Massachusetts and West Virginia. The instructional programs for these three levels (grades 1, 5 and 9) were made operational in September 1967 in the 12 cooperating school districts with about 2,000 students. In succeeding years, the program was developed by teachers for levels 2, 6 and 10; 3, 7 and 11; and 4, 8 and 12, and made operational in the schools. The instructional program involved in the experiment has been gradually expanded until it now embraces some 15,000 students in grades 1-12 at 75 school sites.

John C. Flanagan, chairman of the board of AIR and the "father" of PLAN, says the program's objectives are to help the individual student:

- Acquire information about available choices regarding occupational roles, leisure time activities, and social and civic responsibilities.

- Understand the nature of individual differences; the principles of learning and behavior modification; and the development of abilities, interests and values.

- Estimate, as accurately as possible, the level of development of his own abilities; the extent of his knowledge about specific fields; and his current interests, values and related characteristics.

- Develop skills in planning and personal decision making.

- Formulate immediate and long-range educational, occupational, leisure-time, social and civic goals based on the information and skills outlined in the preceding activities.

- Take responsibility for carrying out his individual development.

- Develop the ability and skills required to manage his own individual development program.

PLAN makes use of the computer as a support tool in administering the program. It scores tests, stores information about students, provides progress reports and suggests the next learning units. The learning units, called teaching-learning units (TLUs), have specific instructional objectives and are contained in modules requiring about two weeks' work. Several alternate TLUs are available for any single module or set of objectives to provide alternate learning strategies appropriate for learners of different abilities and interests. The TLUs lead the student through a sequence of work during which he achieves certain learning skills. The learning assignments in the TLUs guide the students through different resource materials, ranging from books to audio tape materials, individual, small group and large group activities, and open the way for him to achieve his goal by alternate paths over which he has a choice.

Instruction is offered in mathematics, science, language arts and social studies at all levels, grades 1-12. The system involves 5,000 pieces of instructional materials to support 2,700 teaching-learning units representing 6,000 behavioral objectives. Each TLU has its own performance test developed to an 80-80 target, that is, 80% mastery by 80% of the students on first completion of the instructional program for a TLU. The test items are coded to the objectives and are designed not necessarily to measure what a student has specifically studied but rather what he is able to do as a result of having studied something. In addition to its instructional program, the PLAN system also incorporates a guidance program which offers students information about the world of work, assistance in long-range goal formulation and a computer-proposed program of studies.

The guidance program is divided into two components. The first deals with the normal development of the student. Services are provided for all children. The purpose is to develop the student's awareness of himself and his own personal capabilities and knowledge of the world around him (especially insofar as citizenship, leisure and the world of work are involved). Included in this first section of the guidance program is the acquisition of skills dealing with learning how to learn, realistic goal setting, evalu-

ation of personal alternatives and the management of one's own behavior. The second section of the guidance program is concerned with problem detection and remediation. In this latter section attention is focused on differential diagnosis and problem amelioration via prescribed learning experiences and special remedial treatment.

The functions of the computer in Project PLAN are divided into four main categories: (1) routine daily processing to assist the teacher in administrative management of his classroom; (2) periodic (weekly or monthly) student progress monitoring; (3) generation of student programs of study; and (4) data processing to assist evaluation and revision of the instructional system. Most computer processing is done at night. The teacher picks up printouts for his class at the beginning of each day. The daily administrative management printout consists of four sections. The first, an "exceptions section," notes requirements for new information or confirmation of specific student actions. The second section, "acknowledgment of teacher request," responds to individual teacher requests such as special materials or a program of studies for a recent transferee. The third section is the "instructor's planning section." This advises the instructor of the students' activities forecast so that the appropriate materials, transportation and supplies may be arranged. The fourth section, "test results," reports student performance for each instructional module by objective. On the basis of the scores on the objectives, the teacher may be advised that the student has mastered the module, needs to review the instructional materials related to some specific objective or needs to restudy the module.

Student progress reports are prepared, either on a fixed time schedule or on teacher request, to show the status of students. Student progress reports indicate which modules the student has completed, the length of time taken to complete these modules, the level of student performance associated with them and the modules yet remaining in his program of studies.

The third main area of computer service is the generation of recommended student programs of study. This takes into consideration state and local requirements, student interest and abilities, parental wishes, student academic history and instructor recommendations. On the basis of this information, the program of study recommends a module quota for the academic year and a particular sequence of instructional materials judged to be optimum for the student. The specifications for the program of study procedures consist of 200 pages of detailed instruction, flow charts and diagrams, plus an additional 400 pages of tables summarizing approximately 75,000 pieces of coding information describing the characteristics of the 2,700 instructional units in the PLAN repertoire. The program of study is the basic tool for individualization. The balance of the computer function might be classified as an aid to administrative management. That is, it provides the teacher with test scoring services, student monitoring services and materials requisition information. A sample of a computer-generated program of study is included on page 25.

The fourth function of the computer is research and development. Systems data are used for the systematic improvement of instructional materials. By analyzing the performance of students on specific module tests, it is possible to identify areas and items where students are failing frequently.

This information is then used as the empirical base for the future improvement of instructional materials and procedures.

Contrary to what is often heard, PLAN considerably expands the role of the teacher. He becomes a tutor, counselor, reinforcer, organizer, strategist and resource person. Under the teacher's guidance, each student selects an individualized, student-managed program of studies based on diagnostic testing, academic records and interviews with the child to determine his long-range goals and interests.

The teacher uses the computer to monitor tests and other data for each pupil on a daily, continuing basis. Instantaneous retrieval of the data by the computer makes it possible for the teacher to pick up a printout for her class at the start of each school day. The printouts contain test scores, analysis of teacher actions and other guidance information.

The information is further supplemented by weekly processing of a pupil status card indicating achievement within a specific teaching-learning unit. This and other data are used by the teacher in planning and modifying individual programs for each child.

Although the PLAN classroom appears disorganized, its backers contend that it is highly efficient. Informality provides the room with an aura which "makes learning fun." The students work at their own pace. At the same time, they are required to complete tasks within a generously prescribed period of time (the two-week modules). The system also makes use of teacher-pupil conferences to assist in the evaluation of data and to provide a "human touch" to the learning experience.

Project PLAN was launched at the Brittan Acres Elementary School at San Carlos, Calif., in suburban San Francisco. In 1967 Project PLAN included grades 1 and 5 and involved four teachers. It was later extended to grades 1 through 6.

Before PLAN was adopted at Brittan Acres, two teachers spent a year at AIR in Palo Alto working on teaching-learning units, for use in the program. When they returned to the school, special seminars and inservice training were set in motion so that other key teachers could learn how to run the program effectively. They found themselves as tutors, or managers, rather than teachers. While they found it more demanding, it was also "more rewarding."

Students' reaction to the program was generally positive. They enjoyed planning their own learning programs. According to California Achievement Test score results, the rate of growth for PLAN pupils has been greater than among the control group in study skills, reading-vocabulary, comprehension and arithmetic fundamentals. Scores in arithmetic reasoning were found to be roughly the same for both groups. The test results were compared during each of two years.

Students praise the sense of responsibility PLAN offers them. "I don't have to wait for the teacher to begin class," one noted. "I know what I have to do, so I just go on my own." Another said: "It's the first time I have really ever had time to learn something completely."

Parental response has also been generally favorable, according to PLAN's developers, although they emphasize the importance of parent-teacher meetings on the program well in advance of its introduction. Parents at Brittan Acres School, for example, reported their children seemed "anxious to go to school."

A recent statistical study comparing progress of PLAN and non-PLAN students from grade 5 (September 1967) to grade 7 (October 1969) showed the PLAN students performing better than non-PLAN students on the Iowa Tests of Basic Skills in 25 of 33 comparisons. The non-PLAN students did better than PLAN students in 4 of 33 comparisons, and no differences existed in 4 of 33 comparisons. Another study found that for a given pattern of verbal abilities (Differential Ability Tests-Verbal and Cooperative Reading scores), grade 9 students will develop a higher verbal Preliminary Scholastic Aptitude Score if he pursues the PLAN program of studies than if he pursues the traditional program of studies. The advantage is greatest for the lower ability range and somewhat less at the higher ability range.

PLAN's developers contend that the program is not overly costly for the average school district. The pricing structure on a per-pupil basis calls for an initial registration fee of $5 per student with monthly charges of $6 for TLUs, tests and other supporting PLAN documents, and $2.80 for the computer management aspects of the program. An initial fee for the school system to begin the program and line and terminal costs for the school are extras. This makes it considerably less costly than computer-assisted instruction programs, say Plan developers.

While the present PLAN program shows that "considerable progress has been made," and the number of participating schools is increasing, its backers agree that it still faces continued revision and refinement of its instructional programs. They also note that PLAN doesn't work for all students. Some students, and teachers, too, prefer to operate in more highly structured situations. For PLAN in the future, therefore, much work remains to be done.

For more information write: American Institutes for Research, P.O. Box 1113, Palo Alto, Calif. 94302; also Westinghouse Learning Corp., 2660 Hanover Street, Palo Alto, Calif. 94304.

Why Develop an Individualization Program?

John C. Flanagan, chairman of the board for AIR, cites the needs for developing an individualized education program:

"Education has changed a great deal in the 20th century because of changing answers to these questions--who should be educated, what should they learn, and how should they learn it. From a situation in the 19th century in which the prevailing view was that very few children should be educated, there has been a dramatic change to a real effort to provide elementary and secondary education for all young people. Because of the very great individual differences among children, this change from educating a few to educating everybody has required new content and new methods."

Sample Program of Studies (Project PLAN)

017 SLIPPERY ROCK ELEMENTARY SOCIAL STUDIES

0173 LANDERS PAUL
FALL 1970

COMPLETION CODE	MODULE NUMBER	MODULE NAME	NO. OF TIMES TESTED	DATE STARTED	DATE FINISHED
		YOUR TEST RESULTS SUGGEST THAT YOU KNOW SOME OF THE OBJECTIVES OF THESE MODULES IN YOUR PROGRAM OF STUDIES. AFTER REVIEWING THE MODULES, YOU SHOULD CONSIDER CHALLENGING THEM.			
	42-556-2	WORLD PROBLEMS AND ORGANIZATIONS			
		THE FOLLOWING MODULES ARE SUGGESTED FOR YOUR PROGRAM OF STUDIES FOR THIS YEAR.			
	44-557-2	UNITED STATES FOREIGN POLICY			
	44-559-3	RACES OF MANKIND			
SET 47-329	ESTABLISHMENT OF A GOVERNMENT	(COMPLETE 3 OF THE FOLLOWING 5 MODULES. WHEN YOU ARE READY TO BEGIN WORK ON THIS SET, ASK YOUR TEACHER TO START SET NUMBER 47-329.)			
	44-601-2	GOVERNMENT IN EARLY SOCIETIES			
	44-602-2	EUROPEAN MONARCHISM			
	44-603-2	DEVELOPMENT OF DEMOCRACY IN ENGLAND			
	44-604-2	DEMOCRACY IN FRANCE			
	44-605-2	TWENTIETH CENTURY DICTATORSHIPS			
SET	WESTERN MAN	(COMPLETE THE FOLLOWING 3 MODULES. YOUR TEACHER DOES NOT NEED TO START THIS SET. WHEN YOU COMPLETE THIS SET, TAKE ACHIEVEMENT TEST 84-267.)			
	45-653-2	THE MIDDLE AGES			
	45-654-2	THE EUROPEAN RENAISSANCE I			
	45-655-2	THE EUROPEAN RENAISSANCE II			

C = AWAITING TEACHER CONFIRMATION
D = DROPPED

PLAN Schools

The following schools have used PLAN for one or more years:

Illinois
- Waldo Junior High School, Aurora
- Brady School, Aurora
- Simmons Junior High School, Aurora
- Eldridge School, Elmhurst
- Bryan Junior High School, Elmhurst

New York
- Glen Cove Middle School, Glen Cove

Utah
- Frost Elementary School, Salt Lake City

Michigan
- Cascades School, Jackson
- Dibble School, Jackson
- McCullough School, Jackson

Pennsylvania
- Penn Claridge Junior-Senior High School, Claridge
- Harrison Park Elementary School, Jeannette

Rhode Island
- Henry Barnard School, Providence

New Jersey
- Orchard School, Ridgewood
- New Jersey Avenue School, Atlantic City

Connecticut
- Highcrest School, Wethersfield
- Greenfield School, Wethersfield

Washington
- Barge-Lincoln Elementary, Yakima
- Castlevale Elementary, Yakima
- Adams Elementary School, Yakima
- Broadway School, Yakima
- Jefferson Elementary School, Yakima

INDIVIDUALLY PRESCRIBED INSTRUCTION (IPI)

Individually Prescribed Instruction (IPI) is one of the nation's largest and most ambitious programs to develop an individualized system of education. It offers individualized programs in reading, spelling and mathematics for kindergarten through the sixth grade and in science for kindergarten through the third grade. A new IPI social studies program for kindergarten through the second grade is also being developed.

IPI began in 1964 as an actual working operation at the Oakleaf Elementary School in the Baldwin-Whitehall School District near Pittsburgh, Pa. Then, after extensive experimentation and development, IPI programs were installed in six demonstration schools representing various kinds of school populations. Directing the development and expansion of IPI are the Learning Research and Development Center (LRDC) at the U. of Pittsburgh and Research for Better Schools (RBS) in Philadelphia, both of which are mostly federally supported. RBS is responsible for field development, testing and dissemination of IPI. LRDC, the creator of IPI, is responsible for development and improvement of the IPI model.

Favorable reports of IPI spread quickly through the education community, and schools across the country sought to jump on the IPI bandwagon. By 1971, 300 schools were using the IPI mathematics programs, 50 were using the IPI reading program and six demonstration schools were operating the IPI science program. Approximately 80,000 children were learning with IPI programs in 40 states. This figure is expected to skyrocket to 1.5 million in 1972-73 when the IPI mathematics program will become commercially available to any interested school district. James W. Becker, RBS executive director, says he would not be surprised to see 5 million to 7 million pupils in the program by 1974.

What Is IPI?

There are many ways to describe IPI. The official definition explains it this way: IPI is a system of managing instruction so that each child's work can be evaluated daily and so teachers can make assignments for each child which are tailored especially for him.

IPI programs are based on a sequenced listing of instructional objectives. Each objective tells exactly what a pupil should be able to do to exhibit his mastery of content and skill. This is typically something the average student can master in a relatively short time, such as one class period. Objectives involve action verbs such as solve, state, explain, list or describe. They avoid general terms such as understand, appreciate, know and comprehend.

IPI objectives are grouped by content areas. For example, in mathematics the objectives will typically be grouped into such areas as numeration/place value or addition/subtraction. The sequence of objectives in each area is broken into units which represent levels of progress. When a student finishes a unit in one area, he goes on to the next unit. For example, when the pupil completes Level B Multiplication he may either go on to Level C Multiplication or he may move to Level B Division.

IPI lessons are written to permit pupils to proceed independently. They receive a minimum of direct teacher instruction, although a basic aspect of IPI procedure is a provision for detailed diagnosis of pupil skills and abilities and continuous monitoring of pupil progress by teachers. IPI also requires that each pupil's work be guided by written prescriptions which will meet his individual needs and interests. Each day the teacher records his instructional decisions on the prescription sheet for the student to follow. This makes it possible to have frequent monitoring of student performance.

The Student in IPI

The IPI program is based on objectives designed to develop new academic skills or to improve old ones. These objectives are listed on the skills continuum. The IPI student is tested and placed on the skills continuum according to his level of achievement. He then moves through the teaching materials at his own rate, guided by his daily prescription.

IPI materials themselves are instructional and are designed to help each child master the skills appropriate to him. The child masters a new skill (for example, the addition of three digit numerals) largely by the instruction and practice the materials provide. The child works independently in most cases, thus building up his own sense of responsibility and his confidence in his own knowledge. He begins to realize that learning is a process that is dependent on his own participation and initiative. In IPI, the student's responsibility for his own learning often extends to self-correction of his written work. In many IPI schools, self-correction has been achieved by third graders. Self-prescription is the next step in independence, taken by capable fourth, fifth and sixth graders. Both self-correction and self-prescription are important exercises of the student's capacity to be responsible for his own learning process.

Below are listed the steps the student takes in the cycle of diagnosis, prescription and learning. Although these steps are similar in the mathematics, reading and spelling programs, this particular example has been drawn from the IPI mathematics program:

- The student is placed in a unit on the skills continuum by a placement test.
- The student takes a pretest to determine exactly what skills he needs to work on.
- The teacher writes a prescription to fit the student's individual needs. This is essentially an individual lesson plan for each student each day.

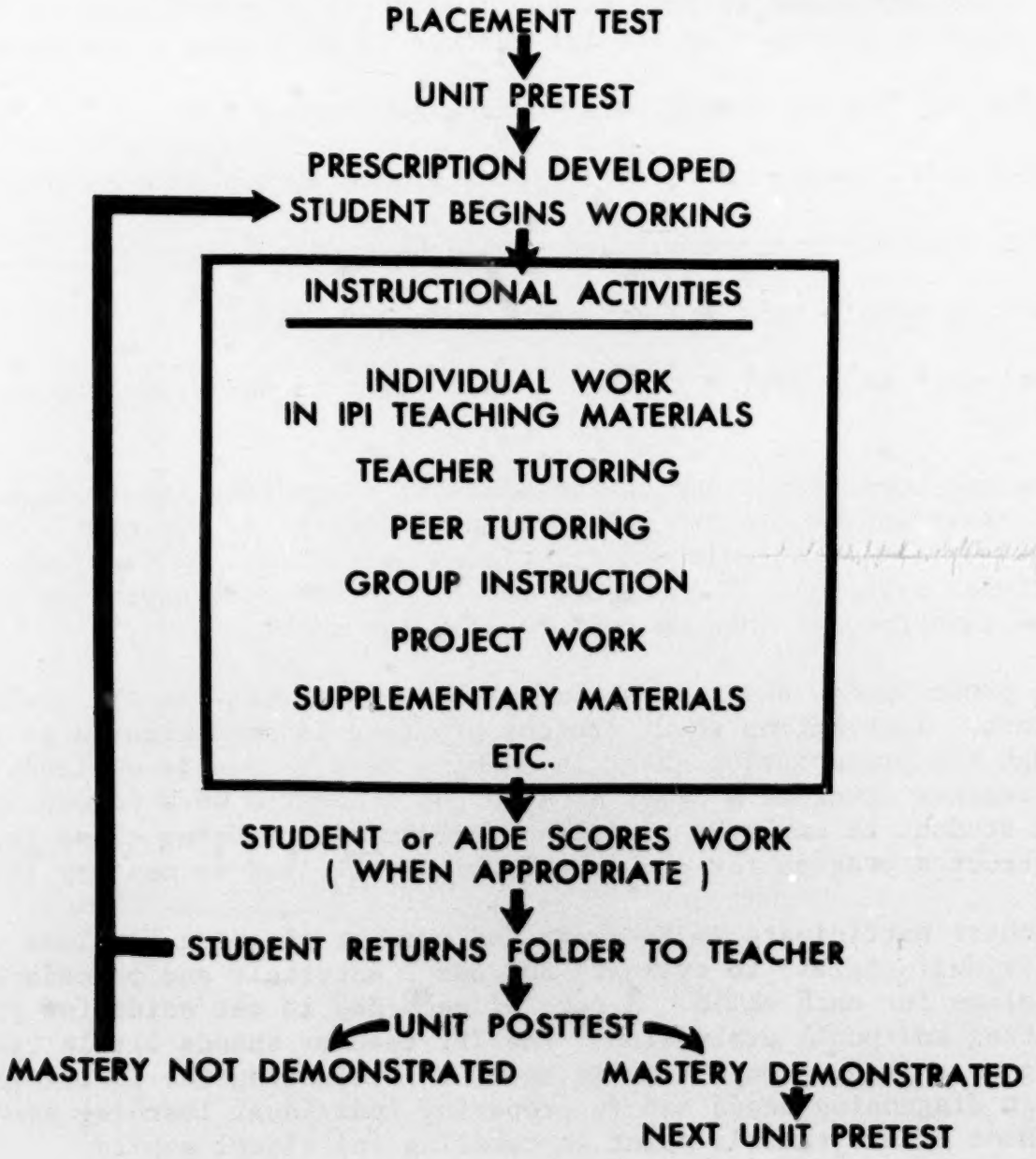
- The student works on a teaching sequence involving IPI instructional materials or other prescribed activities. When the student's work is completed, the aide corrects it and the student returns to the teacher for a new prescription.

- The student's mastery of each skill in a unit is evaluated by a curriculum embedded test.

- A posttest is given at the end of each unit to determine mastery.

The core of the individualized program is in the instructional materials and the prescribed techniques, which will vary for each child from day to day. The chart of IPI student activities illustrates the relationship of this instructional core to the rest of the program.

IPI STUDENT ACTIVITIES



The Teacher in IPI

In IPI, the teacher guides each student through diagnosis, prescription and learning according to the student's needs. IPI recognizes that children differ in a variety of observable ways. For example, children have many different learning styles. Some need manipulative materials to work with. Other students may function well in small group instruction or may benefit greatly from special projects. Others may need more practice on specific skills or opportunities to apply learned skills to new situations. Children differ in many other ways, e.g., level of physical energy, reaction to distractions, frustration level, need to socialize with peers.

IPI offers the teacher a framework within which to individualize instruction for all children, as well as some prepared materials to help in the task. However, since neither is sufficient to individualize instruction, the IPI teacher must add the essential ingredient of instructional decisions. In IPI, instructional decisions are choices a teacher makes in putting together a program of studies for a student by taking into account the intellectual, social and emotional needs of the child. The IPI teacher starts making instructional decisions as soon as the student is placed in the skills continuum. Choices are made by the IPI teacher in answering these questions:

- Which unit skills should this student be working on?
- Which skill sheets of the IPI teaching materials should be prescribed?
- Which instructional techniques should be prescribed?
- How long should this student spend on a unit skill?
- What else can I devise to help this student in mastering the prescribed skills?

He makes these decisions on the basis of diagnostic information provided by the pretest and by his own observation of the child. He must also consider the objectives, materials and techniques available, and the possible instructional settings. The teacher makes instructional decisions for each child and then records them on the prescription sheet.

The prescription sheet is a communication link between the student and the teacher. Information about student progress is communicated to the teacher through the prescription sheet in as many ways as can be devised. Frequently, the teacher attaches a brief note to the student's work folder or confers with the student to exchange additional information. Using these resources, he can construct a program for each child which will lead to mastery in the unit.

Teachers participate in frequent and regular planning sessions to discuss individual pupils, to evaluate and adapt materials and procedures, and to make plans for each child. A part of each day is set aside for prescription writing and pupil evaluation. The IPI teacher spends little time in lecturing to a group. Much time is spent in evaluating the individual pupil's record, in diagnosing needs and in preparing individual learning prescriptions. Most of his time is spent in tutoring individual pupils.

The Administrator in IPI

An important aspect for the smooth functioning of the entire IPI program is that of effective, responsible leadership in the school. This leadership is provided by the administrator. He performs the dual role of manager and instructional leader. How well he carries out his responsibilities determines how well the IPI program works in the school. As the instructional leader he participates in an administrative training program. This program provides complete training in all phases of IPI. The training usually involves a two-week session, conducted at an RBS training site. Furthermore, he trains all teachers and aides who will be working in the program, usually in a two-week summer session.

The administrator, then, is responsible for the smooth functioning of IPI by completing these tasks: training teachers and aides in IPI, organizing and leading regular grade-level planning sessions with teachers about students and instructional plans, providing out-of-class time for teachers to write prescriptions, providing for the continued training of all staff, informing parents and community about IPI and participating in and observing each IPI class.

The Aide in IPI

IPI programs cannot function without aide support. The fact that each child is working on different materials and at his own rate generates many jobs. If the program is to function smoothly, the aides must:

- Score and record student performance on all tests. Feedback to a student and teacher must be fast--the same period or the next day.
- Score and record student skill sheets and keep student folders current.
- Assist the student in obtaining materials from the materials center when necessary.
- Keep a current set of scoring keys for use by aides, students and teachers.
- Organize inventory and order IPI instructional materials.

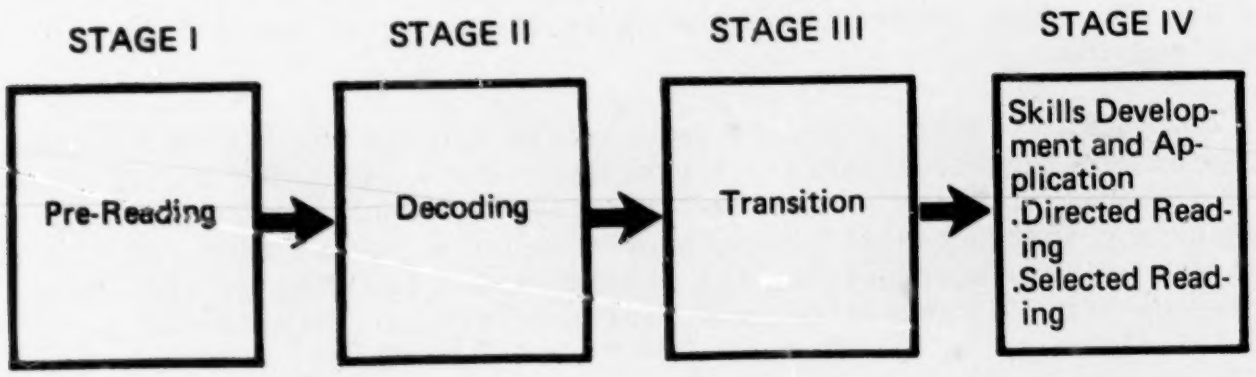
Here's How the IPI Reading Program Works

A detailed explanation of one of the five subject areas covered by IPI--reading--helps to bring the program into sharper focus.

IPI reading is an instructional system designed to permit individualization of elementary reading. The reading curriculum has been developed by sequencing specific reading skills and organizing these skills into units and levels of work. The first three stages of the IPI reading program are built around programmed texts. This material is supplemented by special study materials and audio tapes. The fourth stage, skills maintenance and

application, uses specially prepared materials as well as the library and commercially prepared materials.

To implement individualization, IPI reading has been designed around a carefully constructed set of objectives which are closely correlated with diagnostic instruments. Through daily diagnosis and evaluation, a child can be guided through a continuum of skills that he needs to acquire to become a fully comprehending reader. This is accomplished in four stages:



There are two sub-sets to Stage I: Reading Readiness and Pre-Reading. In addition to the usual reading prerequisites that are taught during Reading Readiness, emphasis is placed on preparing the child for work in his book, the pre-reader.

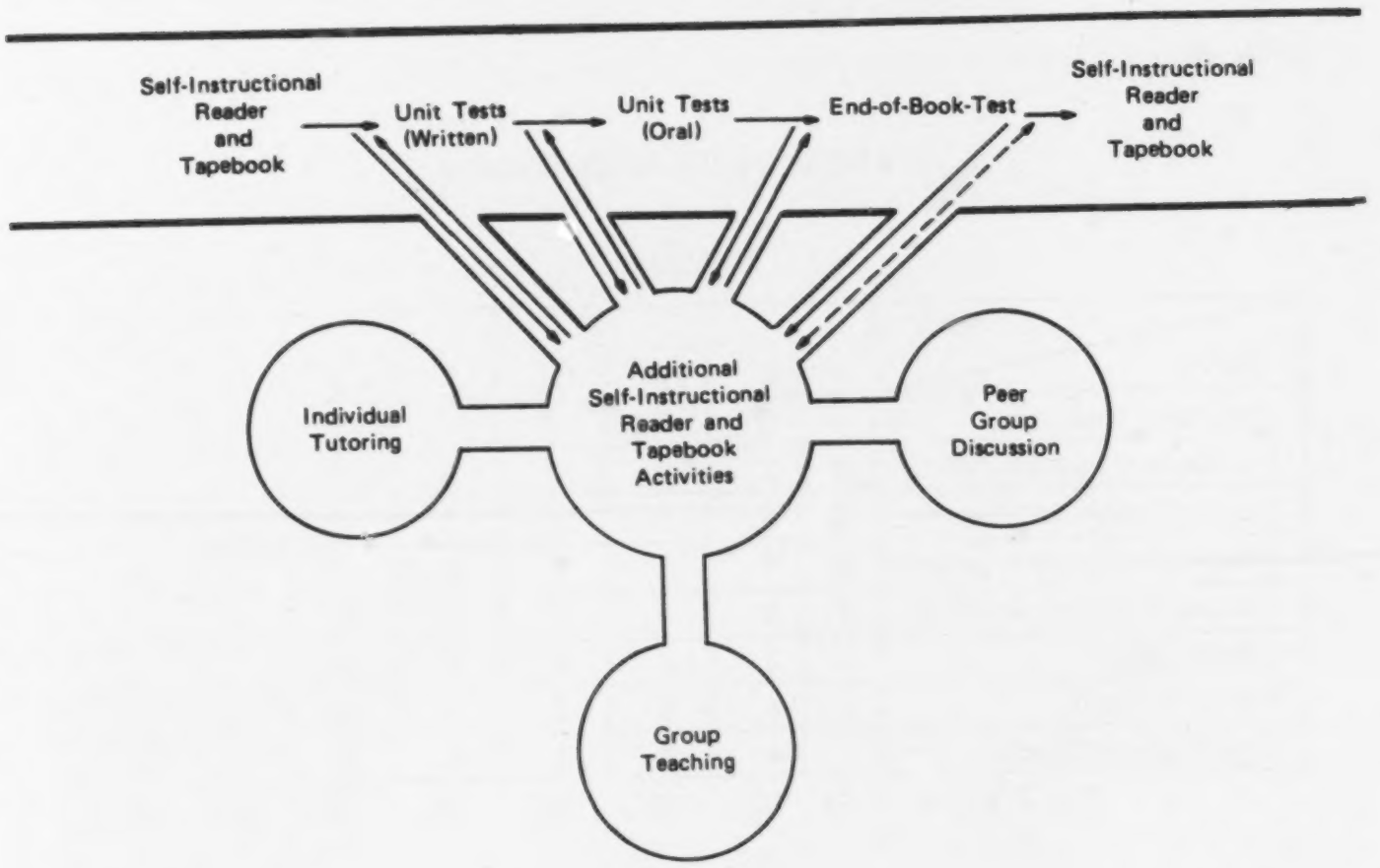
The objective of Stage II of the reading program is to have the child translate printed symbols into meaningful speech sounds. The teacher is able to monitor the child's progress toward this objective not only subjectively, but objectively as well.

The materials used during this stage include self-instructional readers, an audio component with corresponding response sheets and story books for group and individual reading. The story booklets that are used in this stage are implemented in two different settings: (1) teacher-directed group reading, which begins with self-instructional reader 4 and continues to the end of Stage III--Transition, and (2) independent reading, using study guides, which begins with self-instructional reader 9 and continues through Stage III.

This stage of IPI reading has two major aspects: (1) continued instruction in decoding and (2) reinforcement of silent reading and comprehension of a variety of materials.

The instructional materials used in this stage are similar to those used in Stage II (Decoding). The diagram on the next page illustrates the sequence of materials and activities for Stages II and III.

Materials and Activities—Stages II and III



Through the use of the self-instructional readers and their tapebooks, early instruction in the reading skills continuum is made possible in Stages I, II and III without the use of separate skill sheets or additional materials. The chart below indicates the nature and extent of these skills. The numeral represents the number of skills that comprise a given unit.

IPI Reading Skills Continuum

STAGES I II III

LEVELS / UNITS	A	B	C	D	TOTALS A-D
Visual Discrimination	12				12
Auditory Discrimination	6	2			8
Structural Analysis			4	7	11
Vocabulary Development		4	4	4	12
Literal Comprehension	5	4	4	3	16
Interpretive Comprehension	5	8	5	5	23
Evaluative Comprehension	2	3	4	2	11
Library Skills	3	2	3	2	10
Reference Skills		4	1	3	8
TOTALS	33	27	25	26	111

The maintenance, reinforcement and improvement of skills receive concentrated attention in Stage IV. Specific tests are used by the teacher to "home-in" on the children's strengths and weaknesses in the areas listed in the chart below. Separate skill sheets and supplementary materials are used to help the children achieve mastery in these important skills.

IPI Reading Skills Continuum

STAGE IV

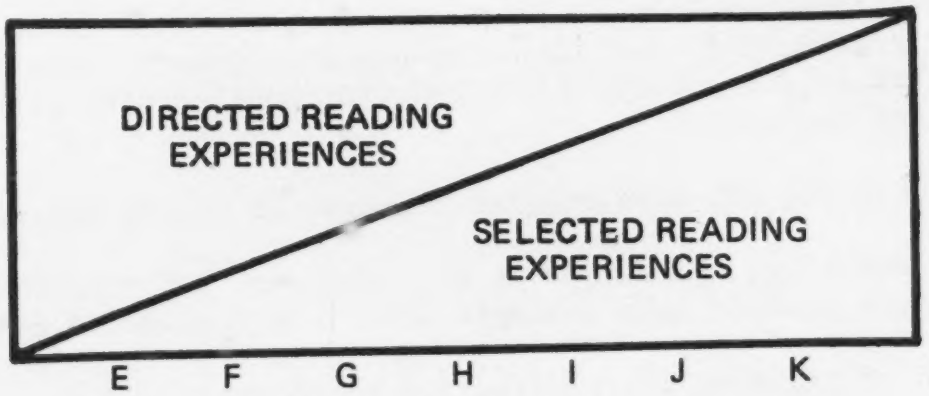
LEVELS / UNITS	E	F	G	H	I	J	K	TOTALS E-K
Structural Analysis	5	6	4	4	3	4	4	30
Vocabulary Development	3	2	2	2	2	2	2	15
Literal Comprehension	3	3	4	3	3	4	3	23
Interpretive Comprehension	5	4	5	5	4	4	3	30
Evaluative Comprehension	2	3	4	3	4	4	4	24
Library Skills	2	3	4	4	4	2		19
Reference Skills	7	5	5	2	4	3	2	28
Organizational Skills		4	3	2	2	4	3	18
TOTALS	27	30	31	25	26	27	21	187

The second part of Stage IV is implemented through directed reading activities in a large group setting. The reading selections are paperbacks which are keyed to the skills continuum. Selections vary from picture stories through lengthy novels. Selections are classified according to level (E-K) and according to category. Each teacher has a large loose-leaf notebook containing lesson plans for each selection. The plans include objectives, needed materials, suggested assignments and evaluation questions. The plans are open-ended to permit teacher judgment and flexibility in teaching the lesson. Below is a chart of this portion of Stage IV.

LEVELS / CATEGORIES	E	F	G	H	I	J	K
Fun and Fantasy	X	X	X	X	X	X	X
Everyday Friends	X	X	X	X	X	X	X
Biography	X	X	X	X	X		X
Science Fiction			X	X	X	X	X
Mystery and Suspense					X	X	X
Animals	X		X	X	X	X	X
Content	X	X	X	X	X	X	
Poetry	X	X	X	X	X	X	X
Making and Doing	X	X	X	X	X	X	X
Adventure	X	X	X	X	X	X	X

Selected reading, the third part of Stage IV, is designed to provide somewhat "open-ended" reading experiences on an individualized basis. Within certain limits, each child chooses what he reads and how he communicates what he has read. The child chooses only those books which are appropriate to his reading level and included in the program. Books in the program have been carefully chosen to provide interesting, varied and readable materials for students on every level of the program. Astronautics, fantasy, medicine, folk tales and short and long fiction are included in the program. Four levels of difficulty have been designated and color-coded to permit greater opportunity and flexibility in student selection.

By superimposing the three pieces of Stage IV, the total picture emerges as portrayed below. It can be seen that directed reading decreases and selected reading increases as the child moves through the skills continuum and acquires greater reading independence and accountability.



Answering Pertinent Questions About IPI

Q. Can IPI be initiated in a conventional elementary school at a cost compatible with that school's present operational budget?

A. No. But with continuous refinements in the system and more research designed to lower the cost, RBS officials hope that IPI can be placed in a conventional elementary school at a reasonable cost in the near future. At present, the cost of IPI materials is about $10 per child per year for the mathematics program. Costs per pupil for the other programs have not been disclosed. Cost has been decreasing over the past four years. For example, RBS claims that costs for instructional materials in mathematics have been reduced by 200% per student.

Q. Does IPI improve student achievement?

A. IPI students achieve as well as or better than non-IPI students on standard tests, achieve higher than non-IPI students on IPI tests, have a positive attitude toward school and demonstrate a change in social behavior, RBS says. In addition, RBS reports that IPI has produced "effective results" with a variety of special populations: disadvantaged, rural, special education, Indians, Mexican-Americans.

Q. How can IPI change the traditional school schedule?

A. "As far as basic skills are concerned," RBS's Becker claims, "I think IPI technology will be able to reduce what is being currently conducted during the whole school day to much less time. It will be possible to let children learn many of the basic skill subjects anytime during the day. We are hypothesizing that the typical school day can be reduced to one-quarter of the time now spent on these things. This leaves a school day in which we can begin to do many exciting things."

Q. Does IPI need a specially built school?

A. No. RBS says school buildings can vary in design.

Q. What are some implications from IPI for teacher education courses in colleges and universities?

A. RBS says IPI has created a need for courses in small-group dynamics, tutorial instruction, individual progress diagnosis, prescription writing, child psychology, child behavior and learning patterns, and testing and measurement.

Q. Do pupils in the IPI math program receive the new or modern mathematics?

A. Strictly speaking, the answer is no. However, RBS says the math curriculum does include many concepts which are considered modern math.

Q. What kind of training is required for teachers?

A. All teachers are asked to work in the IPI summer workshop. The best training seems to be on the job, where a new teacher is associated with an experienced person for a short period of time. Special materials have been ordered by RBS to permit the individualization of teacher training.

Q. What kind of progress reports are sent home to parents of children in IPI programs?

A. This varies from school to school. No one way has been found best.

Q. Who scores the pupil's work?

A. A child's work page is either scored by himself or by an aide. The teacher's time is spent in evaluating the work after it is scored. Aides score all tests (placement, curriculum-embedded, pretests and posttests).

Q. How does IPI allow the teacher to prescribe for many children?

A. IPI relies on information and materials. In order to evaluate and make assignments for each student, the teacher needs a great deal of up-to-date information about the work and academic history of each student. When he makes an individualized assignment, the assigned materials must be readily available without fail.

Q. Do pupils from different grades ever receive instruction together?

A. Yes. If two children in fifth grade are having a problem similar to three children in the sixth grade, the pupils may be brought together in a small group for instruction. After the instruction they return to their usual work area and continue their IPI work.

Q. How is the library related to IPI reading?

A. The library is always open for pupils and there is no limit on the number of books a child may take out. Sometimes complete IPI classes are held in the library. At other times children are seen going in and out of the library for different purposes. An honor system is used for checking books in and out.

Q. Is there any homework in IPI subjects?

A. Generally, no. However, several IPI schools have used the prescription material as homework assignments in specific cases.

Q. Doesn't the freedom and individual attention provided in IPI create discipline problems?

A. RBS answers with a decisive no. "All our experience indicates that discipline problems decrease at IPI institutions," RBS says.

Q. What happens to a student from another school who comes into an IPI school?

A. Diagnostic instruments permit quick assessment of his strengths and weaknesses. Therefore, proper instruction setting and tests can be quickly assigned, RBS says.

For further information write: Clyde C. Yetter, Director of Public Information, Research for Better Schools, Inc., 1700 Market St., Philadelphia, Pa. 19103.

IPI Schools

The following is a list of IPI demonstration/training schools:

California
- Lincoln Model School, Fresno
- Mariners Elementary School, Newport Beach

Delaware
- David W. Harland School, Wilmington

Florida
- Bay Harbor Elementary, Miami Beach
- Oakland Terrace Elementary, Panama City

Georgia
- Hahira Elementary, Hahira
- Lake Park Elementary, Lake Park
- Clyattville Elementary, Valdosta
- Parker Mathis Elementary, Valdosta
- Pine Grove Elementary, Valdosta

Indiana
- Franklin Elementary, Gary

Iowa
- Main Elementary, Marion

Maryland
- Ocean City Elementary, Ocean City

Mississippi
- Green Street Elementary, Tupelo
- Oakland Heights Elementary, Meridian

Nebraska
- Friend Elementary, Main

New Hampshire
- Paul A. Smith Elementary, Franklin

New Jersey
- Allenwood School, Allenwood

New Mexico
- Cuba Elementary, Cuba

New York
- P.S. #134, Bronx
- Chestnut Hill Elementary, Melville
- Primrose Elementary, Lincolndale
- Middle School, Somers

Oregon
- Hoover Elementary School, Corvallis

Pennsylvania
- Tyson-Schoener, Reading
- Daniel J. Flood Elementary, Wilkes-Barre
- Richland Elementary School, Quakertown
- McAnnulty Elementary School, Pittsburgh
- St. Gregory School, Philadelphia

South Carolina
- Fort Jackson Elementary, Fort Jackson

Tennessee
- Piney Woods Elementary, Chattanooga

Texas
- James Bowie Elementary, Abilene
- Hillcrest Elementary, Plainview

Virginia
- John Marshall School, Newport News
- Barrett Elementary, Arlington

Washington
- Midland Elementary School, Tacoma

INDIVIDUALLY GUIDED EDUCATION (IGE)

Individually Guided Education (IGE) provides a framework for individualizing instruction for elementary schools. It is achieved through an inservice program designed to reorganize and redirect the time, talents and energy of all concerned with the educational process. IGE is a way of achieving and integrating such concepts as nongradedness and team teaching. It calls for significant teacher and student involvement in the design of the curriculum itself.

The aim of IGE is to develop and encourage independent student thinking. Building more effective language and number skills is done in the context of problem solving and learning how to learn. A wide range of materials and team teaching methods are used to create learning environments to meet varied pupil needs.

The IGE program was developed by the Wisconsin Research and Development Center for Cognitive Learning; the Institute for Development of Educational Activities, Inc. (IDEA), a nonprofit corporation established by the Charles F. Kettering Foundation; and cooperating educational institutions. IDEA has translated results of its own research and those of other agencies into a multimedia set of inservice educational materials and strategies. The Wisconsin center is developing curriculum materials in several areas which are compatible with IGE concepts.

Both IDEA and the Wisconsin center are engaged in implementation programs through state departments of education, colleges and universities, central offices of school districts, and other intermediate agencies. More than 85,000 elementary students and 2,700 teachers in 170 schools in Wisconsin, Colorado, Ohio, Michigan, Florida, New York and Minnesota were involved in various stages of the program during the 1970-71 school year.

Almost all the schools participating in the IGE program are involved in leagues of 10 to 12 schools as part of a strategy of change developed over the past 5 years by IDEA. Some of the leagues cut across school district lines while others embrace only a portion of the schools within a single district. In all cases, they constitute linkages designed to provide member schools an opportunity for sharing experiences and information on a personal basis and to provide an environment for self-improving schools. A program was launched in the spring of 1971 to greatly expand the number of intermediate agencies and participating schools.

IGE's main tools, according to its developers, are "creative effort and time," as opposed to costly investments in materials and equipment. In spite

of the fact that the program represents a marked departure from the traditional classroom, IGE educators believe that it can be introduced with relative ease into almost any school.

The program places stress on the "humanized classroom" in which students relate to each other, to the teacher and to their work. The teacher is seen as an educational adviser, a creator of personalized learning environments and a skillful instructor. The teacher is deeply involved in all aspects of a curriculum tailored to meet the needs of students. IGE maintains that the decision-making power for designing any individual's learning program should rest largely with the teachers and pupils who are responsible for seeing that it takes place.

Schools taking part in the IGE program are converted from traditional grade levels to a multiunit organizational pattern. Each unit has a professional staff of two to six teachers, one or more teacher aides, and 50 to 150 children of varying age range. There may be a two- or three-year age range of children in the unit with pupils grouping and regrouping as they pursue different learning objectives.

IGE schools operate with an Instructional Improvement Committee, composed of the principal and unit leaders. The committee reviews educational policies to insure that the separate units reinforce each other's work as each youngster moves up the age ladder. The multiunit structure and the committee are the primary means by which self-improvement takes place within an IGE school.

Instructional processes represent the heart of IGE. These processes provide each student with appropriate learning programs built on a continuous cycle of finding out where each student is and how he got there (assessment), deciding what he needs to learn next (specifying objectives), selecting the ways for him to obtain those objectives (diversified learning opportunities), and making sure that he has met them (reassessment).

How each student fits into the program is determined by an assessment the teachers and pupil make of the learner's achievements, aptitude and learning styles as they relate to learning objectives. Children may be placed for varying time spans, depending on the needs and the work at hand, into one of four basic learning modes:

1. Independent. The student works more or less alone at his own rate. This may involve simply reading a book in the classroom or in the library, working with various printed resource materials or with audio tapes or films. When the student needs help from the teachers he's free to get it.

2. One-to-one study. This means access to tutoring, either from the teacher, a teacher aide or another student. It is essential for remedial work, planning and assessment conferences and oral work, such as giving reports.

3. Small group. IGE's developers see the small group as the key to the program. It consists of from 4 to 11 students working to achieve a

common learning objective. It may be teacher-led, student-led with a teacher present or student-led without a teacher present. Its role varies and it stays together for as long as the teacher feels it is necessary for the immediate task. It may function as a tutorial unit, for a discussion, to plan or "brainstorm" a project or to accomplish some other specific task.

4. Large Group. A group of 35 pupils or the entire unit may be brought together on occasion. The purpose may be to hear a guest speaker, to see a special film or to see a show or special program by an outside group or by one of the other units.

How are students matched into the right mode at the right time? The responsibility is the teachers' and, admittedly, it is not an easy one to fulfill. It requires sensitivity and understanding on the part of teachers and an openness to involve students in the design of their own learning programs. It also requires objective measurement of skills.

Using student profiles developed through interviews and diagnostic tests, learning programs are designed to attain specific objectives. Children with similar learning objectives and learning styles are grouped together and the children may move among independent study, one-to-one situations, small group work or large group work, depending on their assignments. Through testing and observation by teachers and aides, each child's progress is carefully monitored. For children having difficulty, the teaching team restructures their program to facilitate learning. "The children know what their learning objectives are and why these objectives are important to them," states an IGE teacher handbook. "The children know what their test scores are and what the scores mean.... The children know what media and learning modes work best for them."

For pupils and teachers in IGE schools, the neighborhood, the community and the world become part of the classroom. A wide range of learning resources are used, including books, periodicals, films, TV, slides, tapes and records. There are also guest speakers and field trips. For "man and his environment," for instance, it could mean taking a sampling of water from a local stream, visiting a laboratory to analyze the water sample, visiting the city's waterworks or going to see an ecology exhibit at a museum or public library. For a theme on "communication," it could mean listening to a Simon and Garfunkel record, a visit to a newspaper or radio station, preparing a scrapbook on the subject or writing a report.

"In effect, IGE allows--indeed demands--you bring the mountain of the curriculum to your young Mohammeds," the teacher handbook advises. "This virtually assures relevance. A student whose learning personality has been the guidestar and yardstick to his curriculum is less likely to ask: 'What does all this have to do with me? Why do I have to know this?' IGE doesn't guarantee academic euphoria...but it does allow your classroom far more than the usual 50-50 chance of becoming important in the student's life." The handbook sums up the case for IGE: "Traditional educational systems tend to squeeze the children into a rigid curriculum. IGE is rooted in the notion that rigidity in curriculum is unthinkable. All decisions about curricula begin with the children and their learning needs."

The cost of implementing an IGE program depends largely on the investment a school district wishes to make. Some schools draw more heavily on volunteers than upon paid clerical and instructional aides. In some instances, schools elect to adapt existing curriculum materials to IGE while in others curriculum committees have selected specific programs that are highly compatible with IGE concepts. School facilities need not be a barrier to IGE. The program is in operation in both "egg crate" and "open plan" schools. Some school buildings housing IGE programs were constructed around the turn of the century.

Inservice training costs for adopting IGE varies among intermediate agencies. Where state departments of education or central staffs of large school districts serve as the intermediate agency, these costs are part of their basic operating budget. Regional educational centers of various types provide the inservice program within their school district membership fee or through special grants for education personnel development. In addition to state or federally funded programs, a number of colleges have established special fees for IGE-related workshops giving university credit. Effective implementation of IGE is a long-term process and the complete program only recently has been available to schools. A comprehensive evaluation of the impact of the program on both students and teachers parallels the implementation program.

Preliminary evidence from the Wisconsin center's early implementation of the multiunit school and incorporation of the curriculum component in reading indicated dramatic increases in student achievement over a short period of time. A 1969 report of Professional Satisfaction and Decision Making in the Multiunit School by Roland J. Pellegrin, professor of sociology, Center for the Advanced Study of Educational Administration at the U. of Oregon, disclosed a high rate of professional satisfaction in the multiunit school. Pellegrin stated that "we have evidence that group participation in decision making is highly regarded by faculty members of multiunit schools. In interviews, high job satisfaction and increased effectiveness were attributed to teacher involvement in the decisions affecting their work."

For more information write: IDEA, 5335 Far Hills Ave., Dayton, Ohio 45429 or Wisconsin Research and Development Center for Cognitive Learning, U. of Wisconsin, 1404 Regent St., Madison, Wis. 53706.

Continuing Renewal Promoted by IGE

Individually Guided Education in multiunit schools may prove one of the most powerful and flexible sets of approaches yet devised for the continuing renewal of educational institutions and the facilitation of learning and teaching. IGE makes possible the involvement of schools and other educational agencies in the problem-solving processes which are the essence of research and development. It promotes innovation, not as an end in itself, but as an answer to human needs."

--National Evaluation Committee of the Wisconsin Research and Development Center for Cognitive Learning

INDIVIDUALIZED MATHEMATICS SYSTEM (IMS)

The Individualized Mathematics System (IMS) is a low-cost, brightly illustrated mathematics curriculum for grades 1-6. Its developers contend that it provides maximum creativity and flexibility for teachers and pupils, and does not penalize pupils if they are not proficient in reading. Diagnostic tests enable the teacher to prescribe the specific topic, level and learning style appropriate for each pupil. Other tests incorporated into the curriculum give the pupil immediate feedback on his work and are usually scored by the pupil himself.

IMS has been developed over the past three years by the Center for Individualized Instructional Systems in Durham, N.C. The center is an affiliate of the National Laboratory for Higher Education, formerly known as the Regional Education Laboratory for the Carolinas and Virginia. During the 1970-71 school year, IMS was used on an experimental basis by more than 10,000 pupils in 37 schools in North Carolina, South Carolina, Virignia and Florida. Previously, major sections of the curriculum were tested on eight schools in North Carolina and Virginia. A revised version of IMS will be field tested by about 135 schools across the nation.

IMS covers 10 topics: numeration, addition, subtraction, multiplication, division, fractions, mixed operations, money, time and measurement. Within each topic, there is a carefully arranged sequence of skills to be learned. The skills are organized into nine levels of difficulty, and each skill, or "behavioral objective," is incorporated into a separate skill folder. There are 376 skills in the IMS curriculum.

IMS is not a workbook or a textbook. It is a series of about 7,500 brightly colored, deftly illustrated 8 1/2 x 11" pages. Each page is laminated in plastic. Pupils mark on the plastic pages with special pencils and pens and, when they have completed their work and scored it, wipe the pages clean with a paper towel and return them to the storage cart. The pages can be used over and over again, and are expected to last at least five years. Mobile storage carts house the entire curriculum, the various tests and the manipulative devices. The carts eliminate the need for storage space, simplify filing techniques and enable IMS to be rolled from classroom to classroom.

The skill folder, the "atom" of the IMS molecule, contains from four to more than 20 pages. The skill folders provide for various types of learning styles, from manipulation of concrete materials such as tokens and counters to increasingly difficult perceptual and abstract styles. Written directions, especially in the lower levels, are minimal so pupils with limited reading ability can successfully use the materials. The use of a large number

of manipulative devices and educational "toys," such as balance scales, centimeter rods and measuring cups, has been incorporated into the curriculum. There are also pages of special activities for pupils to use independently, and some for teachers to use with small groups. Each folder contains two checkup tests which the pupil uses to find out if he has mastered the skill.

The entire system is color-coded, so pupils can easily locate the materials prescribed for them. All skill folders and pages for numeration, for example, are pink; materials for fractions are yellow, and so on. In addition to helping the pupil find the materials he needs, the color-coding provides an additional advantage for individualization. The color identifies only the topic the pupil is working on, not the level at which he is working.

Imaginative drawings, color and familar frames of reference are introduced into the curriculum to make it more attractive and relevant to pupils. The illustrations include a variety of benign monsters, "grape man," and a whimsical but improbable being simply known as "the blob." As one fifth grader at Thomas Jefferson Elementary School in Falls Church, Va., wrote: "I like your cartoons. They are very tasteful. There are a lot of tasteless cartoons around, but yours are very nice." Another classmate added: "We all like the cartoons in the math folders. They help you understand the directions better. They also help you like to work in math more, even though we didn't like math that much."

The IMS curriculum moves the pupil through a series of small steps toward the accomplishment of specific, measurable objectives. It represents an uninterrupted sequence into which the child can enter at any point. Testing in IMS is used to aid the pupil, not to categorize him. The placement test determines his starting point (topic and level of difficulty), and a pretest, taken before he begins work, determines the particular skills in which he needs instruction within that topic and at what level of difficulty.

For example, the placement test might indicate that the pupil should begin work in Measurement, Level IV. There are four skills in Measurement, Level IV, and the pretest might indicate that he has already mastered skills 1 and 2. Therefore, his prescription (teachers write prescriptions for lower levels of the curriculum, pupils often write their own prescriptions for advanced levels) will direct him to the folders for skills 3 and 4.

Checkup tests, generally scored by the pupil, tell him whether or not he has mastered the skill in the folder. If he does not attain mastery score on the first checkup test, he can take the second after he does further work in the folder or has some help from his teacher. When all skill folders in a unit have been mastered, the pupil takes a unit posttest. The posttest indicates whether the pupil is ready to go on to the next prescription, or whether additional work is needed.

Frequent testing is an integral part of IMS. Since it occurs at each small step along the way, it becomes a means of proving success rather than a psychological roadblock. The pupil soon learns that the tests are not there to punish him but to help him. As one fourth grader wrote, "I like IMS because the teacher trusts us to score our own tests. It makes me feel like a teacher myself."

How Does IMS Work?

The following case of the fictitious Marvin Math shows how IMS works. At the beginning of the school year, several hours of class time are devoted to pupil orientation. Marvin and his classmates learn how to find the materials they need, how to score themselves (in the lower grades, teachers and teacher aides help pupils with scoring) and how to record their scores. They also practice wiping pages clean and returning them to the storage cart. Each student makes a simple construction-paper flag (often inscribed "Help!" or "Not Together!") which he props up on his desk when he needs help.

Then the class takes a placement test, which determines for each child "where he is" in the system regarding the 10 topics and nine levels of difficulty. From the placement test, the teacher makes up a "pupil profile chart" for each child. Marvin's profile chart shows he has mastered at least Levels I-III in all topics from "numeration" through "time." He's mastered Levels I and II in "measurement." The profile chart indicates he should tackle Measurement, Level III, which has five skills or "behavioral objectives" in it. Each skill is incorporated into a separate skill folder.

Marvin takes the pretest for Measurement, Level III, and the results indicate he has mastered everything but "Skill 2." Skill 2's objective calls for the pupil to use a ruler with one-inch divisions to measure real objects or pictures to the nearest inch. So Marvin reads his prescription, then finds skill folder 2 in the pigeonhole on the cart marked Measurement, Level III. There are seven pages in the folder, and the prescription calls for Marvin to work pages one through four. Marvin gets a ruler from the storage cart with the manipulative devices and begins work. The first page shows him how to measure a drawing of a souped-up car. On page two, he measures drawings of a pencil and a pair of scissors. Page three asks him to measure and write in the length of eight bar-graphs. Page four is more of the same, with the outlines running vertically rather than horizontally.

Then Marvin takes the checkup test. He is asked to measure drawings of a pencil, a nail, a wrench and a paintbrush. He writes in his answers, checks them against the scoring key and records his score. He got all four right, which is the mastery level for this skill folder. He erases the pages, returns the skill folder to the cart and takes the unit posttest. He achieves mastery level on this, which covers every skill in Measurement, Level III.

The whole process begins again. Marvin goes back to his pupil profile to see what he is to do next and takes the pretest for the new unit. Then he receives a prescription for pages to teach the first of the skills identified by the pretest as needing work. There are always stumbling blocks, of course, but the possibilities for solutions are many. If Marvin does not show mastery of a particular skill on the posttest, or in any checkup test along the way, he may simply require further practice. Thus, more work pages might be prescribed, a group activity might be used to clarify a concept or an advanced pupil might help Marvin.

Often the teacher might decide to work with a child individually or in a small group until a given skill is acquired. Also, teachers are encouraged to develop their own pages to supplement the curriculum. In other words,

the classroom may be organized to make use of IMS materials in many ways. But the fact remains: each child is being taught individually because he is moving at his own pace in a program tailored for him. Dennis Nichols, principal of Morehead School in Durham, points out that achievement in IMS represents mastery of the material and all the requisite skills preceding it. "Under the textbook method," he said, "pupils were often going too fast, being exposed to material but not really understanding it. Using IMS, they stay with the material until they really master it. The curriculum gives us a way to discover and remedy deficiencies on an individual basis."

Because IMS is individualized, pupils do not receive standard letter grades measuring their progress against that of others in the class. Instead, the IMS report card is a variation of the pupil profile chart. Parents receive this form, called a "pupil progress report," four times during the semester. The color-coded chart tells parents where their son or daughter entered the system on the placement test, and what progress he has made.

The role of the teacher in IMS is clearly different from that in the traditional math classroom, but certainly no less important. "IMS provides an opportunity to make maximum use of the creativity and flexibility that master teachers always have brought to the classroom," says J. W. Knight, director of the Center for Individualized Instructional Systems. "IMS allows teachers to abandon the lockstep pace of the lecture method and become prescribers or managers of learning. They spend most of their time working individually with pupils or with small groups--which is what they do best."

IMS Evaluation

Preliminary results of a 1970-71 evaluation of IMS in 23 schools have been both useful and positive. Three skill folders have been completely revised, based on research findings, and about 150 minor corrections have been made in teaching materials and tests. A survey of 175 of the 180 teachers using IMS revealed that:

- All feel the curriculum is attractive to pupils.
- Ninety-eight per cent feel the use of illustrations makes IMS interesting to pupils. And 97% feel that the curriculum, by providing physical, pictorial and abstract ways to teach the same material, accomodates individual differences among pupils.
- Ninety-nine per cent feel that pupils enjoy working with IMS materials and that procedures for keeping track of pupil progress provide the teacher with an up-to-date, accurate picture of each pupil's achievement.
- Ninety-one per cent agree that pupils in the higher grades can assume many of the responsibilities (scoring tests, writing prescriptions) which normally require the assistance of a teacher aide.
- Ninety-eight per cent think their pupils prefer IMS to the textbook they used before, and 73% feel that the parents regard IMS as an improvement over traditional teaching.

Pupils have progressed rapidly through IMS, despite widely varying levels of aptitude and points of entry. Evidence of their progress was obtained from a periodic census of the pupils' positions in IMS and standardized tests which characterized the pupils' achievement levels when they began using IMS. While those with higher aptitudes perform best in IMS, even those with low aptitudes make substantial progress.

Statistical analyses of 10 of the 90 posttests show that experiences with the learning pages, activities and materials result in generally high levels of later performance, regardless of initial aptitude or achievement.

Whether their pretest scores were high or low, pupils scored uniformly high on posttests. This indicates that the skill folders do enable the pupils to master the skills. Most posttest items are answered correctly by 90% of the pupils on their first attempt to pass the tests.

An evaluation of IMS by learning theorist Robert M. Gagne of Florida State U. concludes that "IMS...has the potential for increasing levels of achievement of children over those obtainable with a more loosely planned system. The several excellent features of the system include well defined objectives; an apparently comprehensive coverage of mathematics skills, arranged in sequences which are generally feasible for learning (although specific exceptions may exist); well designed, interesting and attention-holding exercises appropriate to each objective; a variety of relevant class activities providing considerable flexibility to the teacher; a systematic set of procedures for placement, pretesting, assignment and posttesting, designed to make possible student progress in learning based on 'mastery.'"

How Much Does IMS Cost?

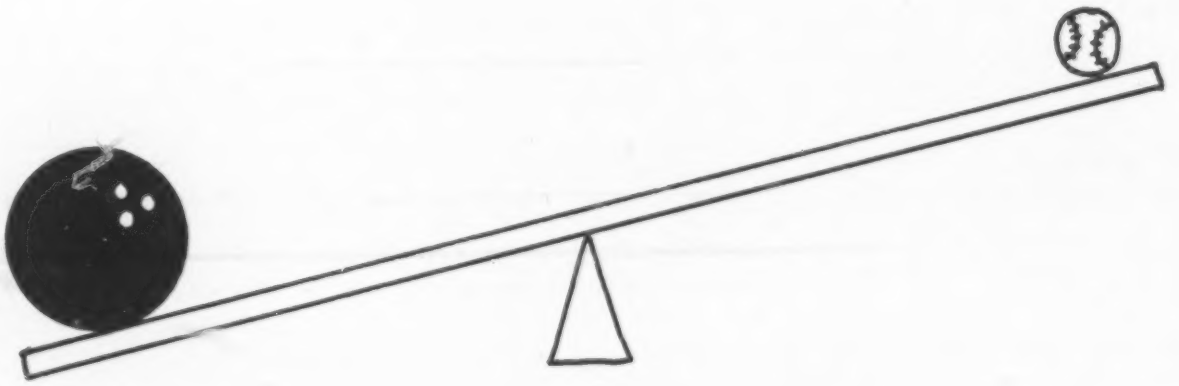
IMS is relatively low in cost for an individualized program. The center is currently producing the materials being used in the testing stage, and the cost is about $16 per pupil for materials which will last five years. First-year cost is $10; cost for succeeding years is $1.50. The average annual cost per pupil over the five years, therefore, is $3.20. This compares to the average cost of about $4 for mathematics textbooks which last about five years. A comparable individualized mathematics program costs about $12 per pupil per year.

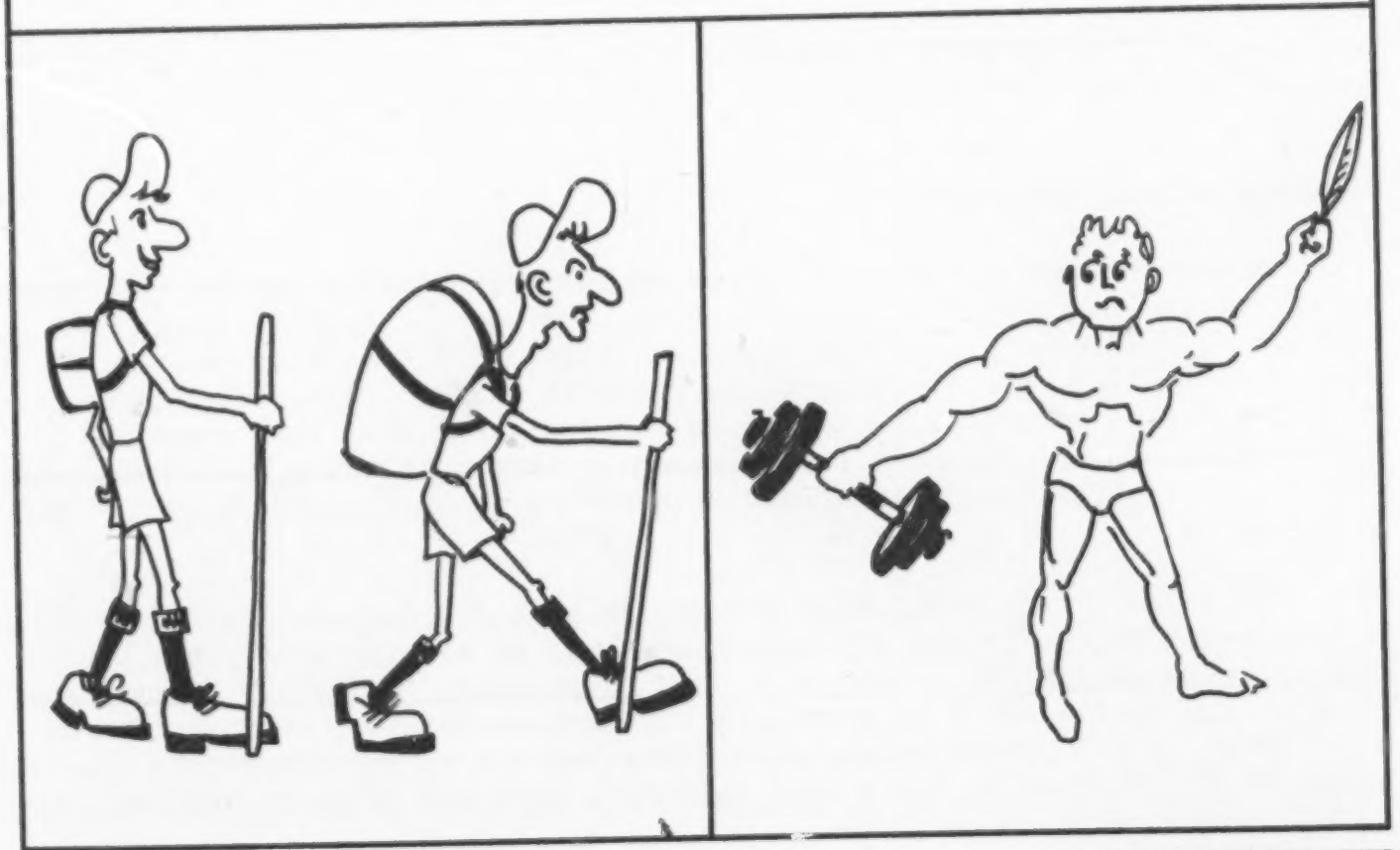
The Center for Individualized Instructional Systems meanwhile has joined with a group of 29 schools (20 school systems) to develop a new section of IMS covering grades 7-9. This will be a three-year, $700,000 project. Eventually, the center hopes to produce a high school edition, so that IMS will span grades 1-12. Future plans call for a variety of individualized curriculums in fields such as the social sciences, physical sciences and language arts.

For more information, write: Director, Center for Individualized Instructional Systems, National Laboratory for Higher Education, Mutual Plaza, Durham, N.C. 27701. Materials available include a descriptive brochure, a directory listing the IMS behavioral objectives and a teacher-training film.

Sample Page

X Lighter





Total Points	Number Correct

Level I

IMS individualized mathematics system

Measurements: Skill 1
Product of RELCV

Sample Page

1. Mrs. Smith bought groceries at the store. She spent 25¢ for meat, 59¢ for canned goods, and 15¢ for fruit. How much did she spend?

_____

2. Tim has 75¢. He spends 18¢ at school. How much money does he have left?

_____

3. Mary's mother gave her 37¢. Her aunt gave her 25¢. How much money does she have in all if her dad gave her 18¢ more for saving her money?

_____

IMS individualized mathematics system

Level V

Total Points	Number Correct
2/3	

Money: Skill 3
Product of RELCV

IMS Schools

The following schools used IMS during the 1970-71 school year:

North Carolina

Appalachian Elementary School, Boone
Belvoir Primary School, Greenville
Belvoir Grammar School, Greenville
Booneville Elementary School, Booneville
Bruns Avenue Elementary School, Charlotte
Clear Creek Elementary School, Charlotte
Frank Porter Graham School, Chapel Hill
Lawsonville Elementary School, Reidsville
Lewisville Elementary School, Winston-Salem
Mebane Elementary School, Winston-Salem
Morehead Elementary School, Durham
North End Elementary School, Reidsville

South Carolina

A. B. Rhett School, Charleston
Allendale Middle School, Allendale
Central Elementary School, Sumter
Chapin Elementary School, Chapin
Courtenay School, Charleston
Edgefield Elementary School, Edgefield
Fairfax Middle School, Fairfax
Jennie Moore Elementary School, Mt. Pleasant
Johnston Primary School, Johnston
Mary Ford Elementary School, Charleston
Pineview Elementary School, West Columbia
Taylor Elementary School, Cayce
Willow Drive Elementary School, Sumter

Virginia

Clays Mill Elementary School, Scottsburg
Deep Creek Elementary School, Chesapeake
Dunbar Elementary School, Newport News
Farmington Elementary School, Culpeper
Lemon Road Elementary School, Falls Church
Lylburn Downing Elementary School, Lexington
Rena B. Wright Elementary School, Chesapeake
Thomas Jefferson Elementary School, Falls Church
Waddell Elementary School, Lexington
Young Park Elementary School, Norfolk

Florida

Wm. Jennings Bryan Elementary School, North Miami Beach
Sabal Palm Elementary School, North Miami Beach

PROGRAMMED LOGIC FOR AUTOMATED TEACHING OPERATIONS (PLATO)

An example of computer-assisted instruction--PLATO (Programmed Logic for Automated Teaching Operations)--was developed by the Computer-Based Education Research Laboratory (CERL) at the U. of Illinois in Urbana.

PLATO allows each student to work at his own pace in an individualized way. Under the system, teacher, computer and students are all members of an interactive team. The teacher designs the instructional material, using a simplified special computer language called "Tutor"; the computer presents the material to the students, at the same time monitoring and evaluating their performance; and students interact with the computer providing information on lesson effectiveness. Each student works at his own pace on material which can provide special information and help when problems arise. PLATO frees the teacher for special work with students which conventional teaching does not usually permit.

Although PLATO lesson writers, including classroom teachers, receive almost no special training, the "Tutor" language has permitted them to develop 1,300 programs in 35 subject areas. Lessons may be written by persons with no previous computer experience, often in less time than it takes to write a lesson in a standard textbook, the developers claim. The language also permits easy revision of lessons already programmed, so that instructional material can be updated or improved.

The PLATO III teaching system presently consists of 75 student stations called "terminals." Thirty-six terminals are located on the campus of the U. of Illinois at Urbana-Champaign. Thirty-nine terminals are located at remote sites, including one in Springfield, Ill., 90 miles from the central computer in Urbana. Up to 20 of the terminals may be used by students and lesson writers at any one time.

A PLATO III terminal consists of a keyset, which transmits the user's request to a central computer, and a video display, which simultaneously shows computer-generated graphic information and computer-selected photographic slides to the user. All PLATO III terminals are controlled by a single computer. The terminals share an electronic slide selector, and each is connected to an individual cathode ray storage tube which provides the computer-generated graphics. Auxiliary equipment, controllable by the computer, can be added to a PLATO III terminal. Film projectors, audio systems, equipment for research in physics and psychology, and other devices have been used.

PLATO III lessons are stored on magnetic disks, allowing rapid random access to large amounts of materials for use by students or lesson-writers.

During student operation, the lessons are stored in the high-speed computer memory.

Educational Uses

PLATO's developers claim it is a valuable tool for the education process, whether it be for presentation of drill and practice routines, tutorial material, problems to be solved, information to be retrieved, simulated experiments or computations.

Since the program began in 1960, PLATO has been used for over 130,000 student-hours of instruction in such subjects as:

Astronomy
Biology
Chemistry
Computer Science
Demography
Economics
Engineering
Foreign Languages (French, Latin, Russian, Spanish, Chinese, Japanese)
Geography
Library Science
Mathematics
Nursing
Physics
Political Science
Psychology
Reading
Statistics
Veterinary Medicine

as well as programs for:

Computer programming
Election statistics
Gaming
Psychological experiments
On-line physics experiments
Simulation studies of technological, social and biological systems.

Features of PLATO

Individualized Instruction:

- Adaptation to students of any age (3 to 70 years old)
- Accommodation to individual rates and styles of learning
- Immediate feedback for student responses
- Provision for remedial and advanced instructional material
- Acceptance of student-constructed answers within minimal constraints.

Flexible and Efficient Equipment:

- Fast visual response (one-millionth of a second for slide images)
- Combined video displays (slide images and computer-generated graphics)

- Random access audio and visual material
- Rapid response to student input (less than one-fifth of a second).

Easy Production and Evaluation of Lesson Material:

- On-line editing and authoring from any student terminal, time-shared with student use of system
- Flexible, but simple, author language
- Complete author control over teaching style and strategy
- Rapid production and revision of lessons facilitated by a wide range of editing aids
- Automatic recording and evaluation of student and lesson performance controlled by the computer.

Future Developments for PLATO

In 1972, CERL will begin expansion of the system with PLATO IV, which will link new terminals to the central computer via telephone lines. CERL officials estimate that up to 4,000 terminals may be added by 1974 and that mass production of the terminals could bring the cost of computer-assisted instruction down to about 35¢ to 50¢ per student per hour. CERL officials say the time-sharing operation of authoring, teaching and computational modes will allow efficient individualized use of PLATO IV with access by students to about 250 lessons at any one time.

PLATO IV will use a plasma display panel in lieu of a cathode ray storage tube, and a high-speed individual slide selector rather than a shared electronic slide selector. A random-access audio device will also be available as optional equipment for the terminal. The added audio capability will allow greater use of PLATO IV by preschool and elementary students who do not read well enough to work with the computer without close teacher supervision.

For further information write: Donald L. Bitzer, CERL, 252 Engineering Research Laboratory, U. of Illinois, Urbana, Ill. 61801.

THE DULUTH PLAN FOR INDIVIDUALIZATION

Specific performance objectives are at the crux of the program of personalized instruction under development by educators in Duluth, Minn. Started in elementary school in 1964, it is now being adapted for junior and senior high school. The Duluth plan uses a multimedia approach that puts the student under contract on each classroom assignment. He fulfills the contract by completing the project and showing that he's learned what was spelled out as the goal of the contract.

The Duluth program recognizes that some learning, such as social responsibility, poise, self assurance and responsiveness to the needs of others cannot be accurately measured or evaluated. But what it does seek to do is measure student learning--or nonlearning--in tangible learning assignments. In a report available to parents and teachers in the Duluth area, the goals of the program were summed up in this manner:

The goal of Duluth's innovative efforts is to enable each student to learn as rapidly as he can or as slowly as he must, and to insure that each learning experience is appropriate to individual needs and capacities. This means that the student must have a measure of control over the pacing of instruction. It also means that he should be enabled to exercise some choice in selecting instructional materials and methods. It is believed that self-pacing and self-selection of experiences will make learning more efficient and at the same time will help the learner to develop self-directedness.

The individual "student learning contract" is the basic tool of the program. It tells the student what to do, what material to use, what his goals are and how he will be tested. Multimedia under the Duluth program, moreover, doesn't mean tons of expensive gadgetry. It makes use of equipment that most schools already have on hand in some form--tape recorders, phonographs, film and slide projectors.

Donald H. Peckenpaugh, superintendent of schools for Duluth, notes that in using the "contract" as a basis for individual learning packages, the "emphasis in our project classrooms is on attempting to make it possible for students to learn different things in different ways. The reason for this is simple: what will be clear and instructive to one student may confuse and frustrate another. Students are permitted to work at their own rate and in their own way. They can work cooperatively on a given problem or they can work alone. They are encouraged to budget their own time. The students generally operate their own hardware, locate their own assignment sheets, assemble and work with appropriate instructional materials and finally take the test that will measure their accomplishment of an educational objective."

What is the role of the teacher under the Duluth approach? "The teacher," Peckenpaugh says, "is no longer so much of an educational broadcaster as he is an academic troubleshooter. He spends less time in front of the class lecturing to students and more time working with students individually or in small groups. He spends a lot of time preparing his instructional objectives and a lot of time analyzing the specific strengths and weaknesses of individual students in relation to these objectives. And, he tries to acquaint himself with a wide range of instructional items that can be used to help students achieve instructional objectives."

The key developers of the Duluth Plan, Thorwald Esbensen, now director of instruction at St. Scholastica College, and L. V. Rasmussen, now chairman of educational administration at Florida State U., say the program's purpose is to make the student ultimately responsible for his own educational destiny. In short, the goal is teaching the learner how to learn.

The average Duluth individualized classroom is a far cry from the traditional row-on-row classroom. The room area in one project school, for example, is two to three times the size of the standard room, and there may be over one hundred students on hand. Walls have been knocked down in 50-year-old buildings in order to provide appropriate settings.

At any given moment, some students will be gathered together in small or large groups, following teacher-led presentations. Some will be at work alone at desks or tables, poring over books and papers. Still others will be viewing filmstrips, listening to tapes or records through individual headsets to avoid distracting others.

Each of the students, in his own way and with the use of written materials, films and tapes, will be working out his assignment, or contract. At all times, he has access to the teachers when he's stuck on a problem or needs guidance. The teachers, in turn, have access to an index file which will show them in seconds what assignment a given student is studying and what his rate of progress has been. The teacher's role, according to John Downs, one of the program's pioneer teachers, is more creative and challenging and brings him into a closer relationship with more students. He leads the small group discussions and supervises the individual study and testing. He also must create the new contracts which are the pegs on which the student builds his learning experiences.

The contract consists of a single sheet of paper. The title of the course--whether language, arts, English, social studies, science or math--is at the top. A student's first contract in a subject is usually fairly simple, making few demands. As the student moves along, however, the contract becomes more complex. See pp. 58-59 for two sample contracts.

Many of the contracts include sample questions or problems on which the student may test himself before taking the test under the teacher's guidance. The list of available resources starts with only one or two items as the student begins his work on a subject, but it goes on to include more and more written materials, films, teacher-led discussions and independent and group work. An advanced sixth-grade contract in language arts, for example, covers 13 separate reference sources.

The student is also encouraged to develop his own resources in classroom work. Eventually, he may even be encouraged to prepare his own learning contract. There is no set formula or style for the contracts to follow. The options are wide and the form is up to the discretion of the teacher.

The Duluth program got under way about the time that Congress approved the Elementary and Secondary Education Act of 1965 (ESEA), and therefore federal dollars were available to get it rolling. Proposals to utilize Title I, ESEA, funds suggested that "an initial expenditure of $2,000 per classroom is needed for nonconsumable instructional materials and equipment."

Esbensen has pointed out, however, that the program can be carried out with a relatively modest initial investment. "Probably the single most valuable piece of equipment we acquired was the tape recorder," he said. "We had one for each teacher. A tape recorder is superior to a record player because it can be used to play teacher-prepared audio materials, the tape can be erased easily and re-recorded, and the stop and start buttons provide versatility. Junction boxes with several earphones connected were provided for every tape recorder to allow undisturbed listening. Each listening outlet had its own separate volume control--a small but important feature."

He added that using a filmstrip projector with a small rear-projection screen was a "particularly good instructional arrangement," and that the filmstrips, which were on the dull side during the program's early years, have been steadily improving in quality and content.

Downs also discounted talk about high costs. He explained that plastic overlays are used with workbooks so the books may be used over and over again. On the question of hardware costs, he added: "The elaborate devices are few and far between. We just make more use of the standard items. For example, we have a teacher-to-tape recorder ratio of 1 to 1. And we use our 16mm projectors a lot. But do you know that most of them are over 15 years old and still operating satisfactorily? The initial outlay for the new technology may be greater, but after that, replacement costs are comparable to those in traditional classrooms."

In addition, the new program requires only minor remodeling of room facilities. This generally consists of knocking out a few wall partitions, installing more electrical outlets, darkout curtains and viewing screens, and installing more shelves and cabinets. The Duluth learning area requires the open look, with screens or shelf partitions breaking up work areas.

The program puts stress on inservice training for teachers, and this was particularly emphasized when the program first got under way. It began in a four-classroom addition to the Congdon Park School in an upper-middle-class neighborhood.

When ESEA was passed, the project was expanded with federal funds into two lower income schools, Franklin and Nettleton. Two years later, a new school--Chester Park Elementary--was designed around the program. The structure consisted of a large shell containing three large learning areas grouped about a central area set up as an instructional materials center. Each pod contained some 120 students at varying grade levels.

'Contracts' Help Students Know What's Expected

"If each student had a crystal ball, he might be more successful at playing the game of school--a game which all too often involves the necessity of guessing what's on the teacher's mind.... There are no crystal balls available, but a well prepared student learning contract, with a clear statement of the expected criterion performance, can fill the same need. It's just a matter of being specific about what the student is supposed to do. The underlying assumption is simple enough: Learning will become more efficient when students know--as precisely as possible--just what is expected of them."

--Thorwald Esbensen
One of the developers of the Duluth Plan

The Duluth Plan has been broadened to put increased emphasis on the child as a person and the teacher as a person with the educational process as a dynamic interaction. In this "personalization" phase of individualization, heavier emphasis has been placed upon recognition of the individual interests and abilities of students and teachers. An attempt is being made to identify and utilize both the personal learning styles of students and the individual teaching styles of teachers. Also, in Duluth, much interest has been shown in developing a positive self-image of pupils.

Duluth educators note that their program hasn't performed any learning miracles, although an element of "excitement" has been added to the school system. "Both teachers and students have the feeling that something good is going on," one educator observed. Students are doing as well, or better on standardized tests as before. As the program has expanded into junior and senior high schools, absentee and dropout rates have been lowered.

For further information, write: Superintendent's Office, Duluth Public Schools, 226 N. First Ave., E., Duluth, Minn. 55802.

ECONOMICS

Content Classification

Aids to the consumer

Purpose

To further pupil's understanding of how testing services help the consumer make better purchases.

Criterion Performance

Given a list of publications or organizations which provide the consumer information about various goods and services, the student will, with 60% accuracy, match the publication or organizaton to a statement explaining its purpose.

Sample Test Situation

Match the publications or organizations listed below with the statement which best explains its purpose.

_____ American Automobile Asscciation	A. The largest consumer supported testing organization
_____ Consumers Union of U.S. Inc.	B. An organization that reports on establishments that serve travelers

Learning Activities

1. Review the section in part 15 of Wilhelm's Consumer Economics entitled "Private Certification Programs."

2. View film Consumers Want To Know, if it is available.

3. Answer the following questions:
   a. Name three private agencies that issue insignia to guide consumers.
   b. Name two magazines that issue seals of approval for products that meet certain standards.
   c. Name four private research laboratories. What kinds of products does each of these laboratories test?
   d. Name two consumer-supported testing organizations.

4. Go to the library and look through some recent issues of Consumer Reports and Consumer Bulletin. Read carefully about one kind of product that interests you and write a report on your findings. Note: How was the product tested? If you were going to buy the product, which brand and model would you choose? Why?

5. Do the problems attached to this contract.

Sample Contract—Duluth Plan

Grade 3

LANGUAGE ARTS

Content Classification

Imaginative use of language
Poetry
Haiku

Purpose

To encourage the students to express themselves in carefully considered words.

Criterion Performance

Given any item of experience (music, literature, film, an observed event, a recollection), the student will be able to make a personal response in the form of an original haiku.

Sample Test Situation

Here are some topics about which you may want to write haiku. Choose one and write a haiku.

1. Sun shining on water
2. Wind sweeping through the grass
3. Crash of thunder
4. Rain splashing against window

Taxonomy Category

Cognitive
Invention

Resources

_____ A. Teacher-led presentation
_____ B. Cricket Songs by Harry Behn
_____ C. The Moment of Wonder by Richard Lewis
_____ D. Japanese Haiku
_____ E. The Four Seasons
_____ F. The Red Balloon (film)
_____ G. The Golden Fish (film)
_____ H. Nahanni (film)
_____ I. Dream of the Wild Horses (film)
_____ J. Tape LA 3

MIAMI SPRINGS: 'PERSONALIZED LEARNING'

Miami Springs Senior High School, an accredited, nongraded secondary school in the northwest section of Dade County, Fla., has developed a program of individualized instruction it calls "Personalized Learning--Freedom of Choice." The program uses a college-type schedule that allows the student to choose when he wants to attend school, what classes he wants to take and how much work he wants to cover.

While students enroll in regular classes, they move within each class at their own pace, although they are expected to complete the required work they set for themselves under a time frame that breaks the school term into nine-week review and testing periods. In their work, the students make use of a wide range of materials, including Learning Activity Packets (LAPs), textbooks, films, slides and other media. "The program allows the student considerable flexibility, and it prepares him for the responsibilities he must face in college," says Alex M. Bromir, principal at the school and the program's originator.

The school, about half of whose students are Spanish-Americans, extends the flexibility into the actual hours which the student wants to be in school. Under the program, classes run continuously between 7 a.m. and 5 p.m. The student may gear his work day to attend classes only in the morning, only in the afternoon, or both. He is offered an additional option--night classes, two evenings a week between 6:30 and 8:45 p.m. The evening classes are credit courses, but are offered as electives or for enrichment. They range from industrial arts to typing to humanities courses with guest speakers. "If a student has a job," says Bromir, "he can adapt his school hours to the job. He could take his first four periods from 7 to 10:30 in the morning. Then he could leave school, go to work and return for his required fifth class two nights a week."

While students have considerable leeway under the program, it remains basically structured and operates with specific regulations, many of them self-determined by students. Attendance records are kept as required by state law. Unsatisfactory absences or tardiness are reflected in the conduct grade and excesses of either may affect the granting of credit. Students must be in their assigned study station and working during regular class periods even though they are performing a form of independent study.

The general orientation instructions for students in the program tell the student: "Each of you in a sense will be in a class by yourself, progressing individually and only as you achieve successfully through each of the many learning activities that make up the course you are studying. You

will move to the study of each successive new unit only as you demonstrate clearly that a high degree of learning (of concepts, methods, skills, etc.) has taken place. While liberal time limits will be set in each continuous progress course to allow you to work at your own pace, there must be some continual progress!" The students are warned that unless they show sufficient progress under their individually paced schedules, they may have to put in additional time after school. They must complete the required LAPs even if this means completing the work in the summer session.

Academic subjects under the program are offered at different levels of pace and difficulty, and evaluation of the student is always done relative to the level of difficulty on which he is operating. The levels are known as phases. They reflect not the grade level at which they are taught, but rather the student's ability to grasp the subject and his willingness to throw himself into the task.

The phases are coded as follows:

- Phase 1. Courses at this level are designed to help students who are quite deficient in basic skills and need much personal help and attention. Students are marked "satisfactory" or "unsatisfactory."

- Phase 2. Courses are designed to help students who are somewhat deficient in basic skills.

- Phase 3. Courses are designed for students who are achieving success within the norm of average attainment and mastery.

- Phase 4. Courses are designed for students who desire to study a subject in great depth.

- Phase 5. Courses are designed to give the student the opportunity to take a college-level course while still in high school. This is done under the established Advance Placement Program.

- Phase 6. Courses at this level require special criteria and approval of the instructor for enrollment.

- Phase X. Courses at this level are open to all students, and no criteria have been established to predict success at any given level.

Most of the regular courses such as mathematics, biology, chemistry, English, typing and business education courses involve the use of learning activity packages, and the student is required to complete a certain number of LAPs to obtain credit. Each LAP tells the student the "why" of the package. It sets the instructional objectives or goals; outlines what work has to be covered, including what reference materials to use (whether textbooks, tape recordings, filmstrips or other materials); and provides self-tests and an overall review test to determine whether the student has a grasp of the subject matter. The "activities" in each package consist of problems, questions and answers, statements for agreement or disagreement, small group discussions, answers to imaginary situations, vocabulary, field trips and reports. For the interested students, the packets also offer "depth study."

In addition to self-tests and teacher-administered tests for each learning package, the students also get mid-year and year-end examinations. Finals may not be taken until the student has completed all of his LAPs.

The LAPs themselves were developed by the teachers within their own subject areas. During the program's early stages, the materials were prepared during planning periods and after school. Once developed, they were evaluated by other teachers as well as visiting committees of educators. They were revised as necessity and experience in the classroom demanded.

Miami Springs students readily accepted and adapted to the new curriculum once it was introduced. It took a little more time, including a concerted community education effort, to convince parents that the program was sound.

In the history classes, Bromir explained, students under the program were taught to evaluate material and form opinions rather than memorize facts. Some parents, as a consequence, brought charges of indoctrination by teachers and a failure to emphasize factual materials. The complaints, however, were generally disproved by the good performance of the students on standardized tests, said Bromir. To reach parents, a monthly newsletter was initiated, coffee hours for parents of entering students were held and an annual back-to-school night was organized.

The goals of the Miami Springs individualized program are being met, say school officials. The objectives are to develop skills designed to encourage continuous learning throughout a student's life, to create and instill positive attitudes toward learning, and to develop social responsibility toward others, the school and the community.

In addition to these subjective evaluations, it should also be pointed out that the dropout rate for the first four years of the program has been reduced to 2%. This is cited by the school's administrators as "an indication of the program's success." School administrators meet regularly with groups of students to evaluate the program. Most of the student reaction has been favorable.

The cost of the program has been nominal. The only additional money the school received was a $60,000 grant under Title III, Elementary and Secondary Education Act, as a national demonstration school. The funds were used for inservice teacher training, systematic visits by teachers to innovative school systems in and out of the state and hiring research and community relations staff assistants.

For more information write: Principal, Miami Springs High School, 751 Dove Ave., Miami Springs, Fla. 33166.

HAWAII: INDEPENDENT STUDY PROGRAM

A method of individualizing instruction through an independent study program for elementary school children has won praise from pupils, teachers and parents at the Kahala School in Honolulu, Hawaii. Developed by the administration and teachers at the school with the approval of the Hawaii Dept. of Education, the program operates for students in grades 2-6 and is designed not only to provide self-selected learning activities for the more capable students but also to help motivate students who are underachieving in regular classrooms, as well as those students who have various types of learning problems.

Students in the program plan their own learning. They select what they want to study and how they want to go about it. Individual counseling is provided to assist them, if necessary, in making choices and offering suggestions on the course of study.

The objective of the program, according to Kahala School Principal Estelle W. Murphy, is to "develop the individual capacities of each learner through self-selected and self-directed activities in any field of interest through provision of proper guidance, a suitable environment and adequate equipment and materials." The idea of self-selection of topics in any field of interest which need not be related to the school curriculum is the Kahala School Independent Study Program's unique characteristic in individualized instruction. Choices are based upon student interest and curiosity. It is the relevancy of the subject to the student which motivates him to approach the learning experience with enthusiasm and interest.

The classroom teacher is an integral part of the program, and its success or failure depends on him. He encourages the concept of independent study with his pupils, explores subject interests with them and arranges for their release from classroom activities to a special independent study room in the school. The teacher arranges the individual pupil's schedule with the school's program coordinator. He also provides the time or space for the sharing of project results with the rest of the class.

The independent study coordinator, another key member of the program, is responsible for scheduling the student, for assisting him in locating information and using materials and equipment and for supervising the pupil when he is working in the library-media center. The coordinator is also responsible for securing or developing learning aids for specific children who may have difficulty with printed materials, and for demonstrating the use of various types of audiovisual equipment which are necessary as part of the independent study experience. As the pupil progresses with his project, which may extend

anywhere from five days up to three weeks or longer, the coordinator confers regularly with the pupil, checking his progress and evaluating his effort.

The third member of the independent study team is the school librarian. He is responsible for the acquisition of the necessary printed and nonprinted materials for the various instructional programs in the school.

Kahala School's independent study center is housed in a stack room for professional books and textbooks which was rearranged to include eight study carrels. A small storage room also serves as a place to make tape recordings and to practice final presentations. Up to eight pupils may use the facilities at any one time, and the maximum time any pupil spends in the room is 90 minutes per day.

The materials available as part of the independent study program include audio tapes, phonograph records, filmstrips, film loops, pamphlets, pictures, prepared transparencies, maps and globes, models, specimens and a wide range of printed materials. Learning to utilize audiovisual resources effectively is an integral part of the program, as is the production of audiovisual materials such as transparencies, charts, drawings, tapes and slides.

Teachers agree that the program has genuinely perked up the learning efforts of their students. Ninety-seven per cent of the teachers said they saw major benefits for the children in the program. Some teachers underscored "the ability of their students to use library and reference skills more effectively than students who have not been involved."

Parental responses were almost unanimously enthusiastic. "Thank you for giving my son this opportunity. He has thoroughly enjoyed it," wrote one parent. Wrote another, "I think it was a great scheme because it put Anna in charge of her own learning. It gave her a sense of responsibility that made her feel good. She particularly enjoyed being mobile in collecting her own visuals and materials." Another parent concluded, "I really think this is the most exciting program in the elementary school. Jim...showed far more enthusiasm during his study in the library. He came home and was teaching us all about Alaskan dogs. We happen to have one."

In addition to praising the program, the children also voiced some suggestions, like "get more equipment, a bigger room, bigger carrels, bigger globes and air conditioning." Commented another, "I think it's fun and just great...but get more carrels." Only about one-third of the student body has taken part in the program so far because of the limitations of space and staffing, but all agree that "everyone should have the chance to do it." School officials at the present time are working toward that goal.

Kahala School personnel think their independent study program could be easily adapted by most schools, using existing resources and equipment. It is flexible and leaves the details of planning and organization up to the particular school. They also note that teachers require a minimum of inservice training to effectively carry out the program.

For more information write: Principal, Kahala School, Hawaii Dept. of Education, 4559 Kilauea Ave., Honolulu, Hawaii 96816.

Other Reports by the Editors of Education U.S.A.

AASA Convention Reporter. Highlights of the 1971 Annual Convention of the American Association of School Administrators, Atlantic City, New Jersey, February 20-24. #411-12786. 24 pp. $2.

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